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# Contractors and Engineers Monthly

Vol. 36, No. 11 NOVEMBER, 1939 $2 a Year, 20 Cents a Copy

## Highlights Of This Issue

- **Accuracy the Watch Word**
  The batching plant for the 900,000 cubic yards of concrete which went into the first stage of Marshall Ford Dam in Texas was featured by novel control devices and added gadgets to insure the accuracy of the batches.
  See page 2.

- **The Battle Is On**
  Word has reached us that snow has already fallen in some sections of the country. This should remind us all that soon, at least in the states in the snow belt, the battle with winter will be on! Nevada's winter problems and how they are handled are described in this issue.
  See page 2.

- **Equipment Can Pay for Itself**
  A system of equipment rentals to finance the purchase and maintenance of equipment is of interest to all state and county highway engineers. The rates used by Chippewa County, Mich., based on accurate cost data over a period of years, are described in this issue.
  See page 7.

- **Fleet of Drills Speed Rock Work**
  Pneumatic equipment on a large scale, including forty-two wagon drills and thirty-six jackhammers, made possible the removal of 3,000,000 yards of rock at the site of Shasta Dam by the end of July.
  See page 13.

- **New Safety Traffic Marking**
  Last summer Minnesota adopted a new center-line marking system, similar to that being adopted in many other states, to indicate no-passing zones. Adherence to this new system, devised for greater motoring safety, is being strictly enforced.
  See page 18.

- **Repaving City Streets**
  Last winter an extensive program of repaving by contract was launched in Richmond, Va. The contractor's methods and equipment for resurfacing are described in this issue.
  See page 20.

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The Editor (Right) and the Publisher of CONTRACTORS AND ENGINEERS MONTHLY Select the Silver Cup and the Plaques for the Winners of the 1939 Roadside Development Awards

## Roadside Development Awards Now Selected

The Sectional Award plaques and the National Award trophy for the 1939 Annual Roadside Development Awards of CONTRACTORS AND ENGINEERS MONTHLY have just arrived at our office, after a painstaking search for suitable symbols of excellence of execution of roadside-development projects and valuable suggestions for improved methods and operations by road contractors.

(Concluded on page 17)

# Digging and Lining Section of 46-Mile Contra Costa Canal

(Photo on page 32)

### "P. M. W. Co." Building Second Section of Canal To Use Shasta Water for Widely Varied Services

✦ WORK is in actual progress on several sections of the 46-mile Contra Costa Canal in central California. The canal, a feature of the Central Valley Project, is expected to aid in the rapid development of both crops and industries in Contra Costa County, which lies to the east of the Bay cities of Oakland and Berkeley and generally southwest of Sacramento. Since the work is a Bureau of Reclamation project, the general understanding throughout the country has been that it was essentially an irrigation project. This is true, but the service to be rendered by the Contra Costa Canal goes far beyond watering the crops of walnuts, grain, grapes, almonds and peaches in the Contra Costa County Water District which has an assessed valuation of $40,000,000.

The water supplies of Oakley, Antioch, Pittsburg, Walnut Creek, Port Chicago, Clyde, Pacheco, Concord and Martinez, representing a population of more than 30,000, have heretofore been taken from the San Joaquin River and from wells. The heavy pumping on the wells has resulted in lowering the water table to a point where brackish water from the tidal reaches of the river has entered the wells and seriously damaged their value for domestic and industrial water supplies. Antioch pumps from the river during high flows and stores the water; the California Water Service Co. does the same for Concord, Walnut Creek, Martinez and Port Chicago. As pumping is possible only during high stages of the river when the water is fresh and free of salt contamination, low water in the river means a shortage for these communities. With the prospect of an assured fresh supply from Shasta Dam, via the Sacramento River, a delta cross channel to the San Joaquin River and the Contra Costa Canal within a few years, a number of industries have announced programs of expansion.

#### Progress on the Canal

Section 1 of the canal is a broad earth ditch from Rock Slough on the San Joaquin River near Oakley extending 4 miles west. Work on this was begun in October, 1937, by Haas, Doughty & Jones and Marshall & Stacy of San Francisco and was completed in July, 1938. It includes four reinforced concrete siphons and four farm bridges. This section of the canal has a capacity of 350 cfs and is subject to tidal fluctuation. The contract for its construction was awarded on the low bid of

(Continued on page 26)

# Vidalia Levee Set Back By Fast Hauling Outfit

### Driver Co., Memphis, Tenn., Used Trailer Wagons for Long, Fast Haul; a Part of Town Also Moved

✦ CONTINUING its program of providing a greater cross section of channel for the Mississippi River in flood stages, the Mississippi River Commission made cut-offs, deepened channels and widened the distance between levees where required. In the spring of 1939 the town of Vidalia, La., opposite Natchez, Miss., was moved a half mile back from its river-front location and a new set-back levee built. The portion of the town moved included the jail, a brick structure of such ancient vintage that it was torn down, and another brick dwelling of veneer construction moved successfully by taking down the brick, transferring the wooden frame to the new location and then rebuilding the brick walls. Most of the structures were of wooden frame construction and were moved easily after an individual settlement had been made with each owner by the Fifth Louisiana Levee District. "Business as usual" was the motto during the moving even when the Piggly-Wiggly store was in transit, although for safety the self-service feature was temporarily suspended and customers were served at the front door.

The new levee built to protect the town is the standard Type B section with a 10-foot crown, a 1 on 3.5 river-side slope and a slope on the land side from the crown to intersect a 1 on 6.5 seepage line from 1 foot below the crown on the river side where the seepage line intersects the ground surface.

#### Loading the Dirt

The contractor had practically unlimited borrow available, making the choice of pneumatic-tired hauling equipment an excellent one. He was required to move 650,000 yards of sandy loam, in which the sand predominated, a distance of 3,000 feet from the river bank. Actual moving of dirt was started January 25, 1939, and by February 15 the contractor had moved 50,000 yards. About this time the pit was threatened with high water but as the pit face was from 10 to 12 feet high and worked with a dragline, work could still be continued when the water had risen as much as 5 feet in the pit.

(Concluded on page 31)

C. & E. M. Photo
A Lima 101 Loading Borrow Material to One of a Fleet of 10-Yard Trac-Truks

# Accurate Concrete Batching Controlled Automatically At Marshall Ford Dam Plant

## Effective Material Handling Included Several Devices Developed on the Job to Increase Accuracy of Mix

(Photo on page 32)

✦ HAVING described in some detail the preparation of aggregates for the concreting operations for the initial stage at Marshall Ford Dam, near Austin, Texas, in the September, 1939, issue of CONTRACTORS AND ENGINEERS MONTHLY, we are devoting this article to the efficient concrete batching and mixing plant and the actual placing of the concrete in the forms. Over 900,000 cubic yards of concrete was required in the low dam, which is nearing completion, and for the high dam the yardage is increased to nearly 1,800,000. Brown & Root, Inc., of Austin, Texas, and McKenzie Construction Co., of San Antonio, Texas, were the contractors for the low dam at their bid price of $5,781,235, but after the contract was awarded extra work orders and orders for changes increased the original bid price to approximately $7,000,000.

### Bulk Cement Handling

The bulk cement for the concrete work at Marshall Ford Dam was received by rail on the contractors' spur-track and delivered to the storage silo or to the 300-barrel batching silo by an 18-inch Goodyear belt 800 feet long driven by a 20-hp motor at 250 feet per minute. Longhorn, Trinity and Republic cement were used. When the batching silo was filled, the excess cement ran direct to a 5,400-barrel silo beside the concrete plant. When cement was taken from storage it was fed by screw feed to a bucket elevator which raised it to the batching silo.

A particularly interesting feature of the cement batching was the rotary valve developed by C. L. Harmon, Plant Foreman, to prevent overrun of cement in the batching. For a month or two at the start of the job the overrun was as much as 60,000 pounds per month, a loss that could not be countenanced. This was caused by the cement running past the feeder screw. To stop this flow positively the rotary valve was developed. The feeder screw was run at high speed to deliver the first 700 pounds of cement to the weighing batcher, then an electric eye automatically cut the speed to low and actuated a solenoid that rotated the valve 90 degrees, cutting the flow of cement into the screw, and the last 41 pounds of cement was taken from the residual material in the screw and the short neck between the valve and the screw. An unaccounted-for weight of only 38 pounds was reported by the inspectors for the month of January, 1939, which is an infinitesimal per cent when it is remembered that 31,334,208 pounds of cement was used during that time.

### Conveying Aggregates

The aggregate bins mentioned in the earlier article had a capacity of 1,500 tons each and there were five, one for each size of aggregate used in the concrete. A concrete tunnel beneath the bins was used for the recovery of the aggregates delivered to the silos by the aerial tramway system. The recovery conveyor was a belt 30 inches wide and 250 feet long. This delivered the aggregate selected to a 30-inch Goodyear belt 350 feet long rising to the top of the batching plant where the belt operator delivered the materials to the proper batching bins by means of a swivel head. Each of these bins held from 50 to 75 yards of material. The selection of material to be delivered to the batching bins was signaled by means of lights by the belt operator to the man in the recovery tunnel.

### The Batching Control Table

Batching for the concrete was controlled with a Blaw-Knox combination automatic and manual control board located immediately beneath the batching bins. The table measured approximately 5 x 4 feet and across the top had the various materials to be batched listed on metal plates. Immediately beneath these was a row of red lights which were illuminated when the weighing batcher for that material was filled to the predetermined weight. A cut-off switch beneath these made it possible to eliminate any one or more of the materials from batching when the automatic batching switch, or master filling switch, in the lower left-hand corner of the table was thrown by pushing a button. Adjacent to the master filling switch was a lever which discharged all aggregate-weighing batchers into the hopper below for delivery to the mixers. This did not control the water, as that was given a 2-second lead on the aggregate on its way to the mixers. At the right of the discharge switch was a mix selector. The various mixes used were set up on the beams of the scales and connected so that when the selector was thrown to any one of the four positions the proper weights of each of the required materials were automatically weighed out. Next was the discharge signal, a red light on a double throw switch connected with a line to the mixer operator. When the mixer feeder head was in position, the mixer operator threw his switch and lighted the red light on the control board and the

(Continued on page 16)

C. & E. M. Photo

**A Lorain 77 Swinging a Skullcracker Demolishes Buildings on the Site of the Manhattan Plaza of the New Queens Midtown Tunnel, New York City, Being Constructed Under the East River**

## Clearing Plaza Area For New York Tunnel

(Photos on page 4)

The familiar crane which we see handling construction material or employed as a dragline on excavation is not always used constructively. Cranes with 1-ton skullcrackers were used by contractors in demolishing the dozen or more brick and concrete buildings for the Manhattan entrance plaza of the Queens Midtown Tunnel in the area between First and Second Avenues and 36th and 37th Streets, New York City. The destructive skullcracker was no respecter of buildings, for with one lusty heave the Lorain 77 with a 70-foot boom swung against the cross at the top of the facade of a parochial school and toppled it from its lofty perch. Steel I-beams, masses of concrete and heavy brick walls went the same way because of the skillful handling of the crane operator in his 1, 2, 3 performance of "Get set, swing, crash."

The running mate of the Lorain 77 was a Lima 701 with a 95-foot boom which did most of its work around 37th Street, while the Lorain was making a clean-up along 36th Street.

The illustrations on page 4 show: (top) the surviving library on 36th Street showing the boom of the Lorain just as it knocked out a heavy I-beam which supported the top wall of the parochial school; (bottom left) the fatal blow dealt by the Lorain to the top of the school structure; (center) a little later, another view on 36th Street with the top of the school gone and several other holes shown in the heavy brick facade; (right) the 95-foot boom of the Lima 701 looms up taller than the Empire State Building seen in the distance, towering above the Second Avenue Elevated structure as seen from 37th Street.

(Concluded on page 9)

# Battling With Snow On Nevada Highways

## High Winds and Deep Snows In Northern Part of State Place Strain on Equipment And Personnel

By FRED G. GREULICH, Nevada Department of Highways

(Photo on page 32)

✦ KEEPING travel lanes open for traffic to move safely over Nevada's roads during winter months has developed into one of the most important functions of the Department of Highways. This function involves a service to commercial and passenger traffic in the normal flow of business over the main-traveled roads which is growing in importance annually. The slogan adopted by the officials of the Nevada Department of Highways is "Traffic must go through in spite of snow."

Cross-state arteries comprising the hard-surfaced roads are cleared of snow as rapidly as possible. Even during the most severe storms the plows work constantly to keep traffic lanes open. Often the blizzards temporarily defeat all efforts of the maintenance crews but eventually, with adequate modern snow-removal equipment, the crews are victors in the battle.

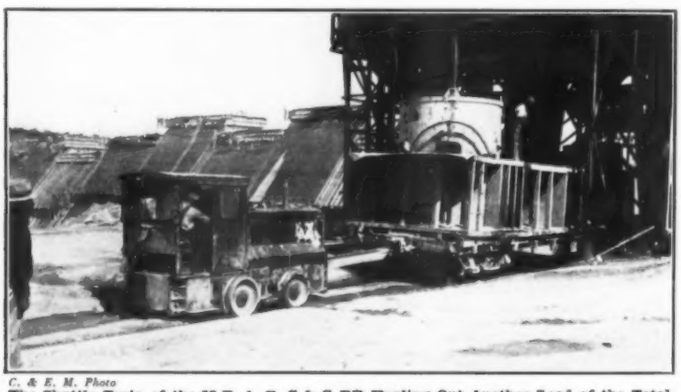
Secondary roads are also attacked and cleared after the peak load of the primaries has diminished. Travel lanes are cut through huge mountain drifts as well as across heavily blanketed valleys in all sections of the state where winter conditions prevail. This "snow belt" is pretty well defined and covers approximately the entire northern half of the state. Here most of the Department's snow-fighting equipment is needed to battle the snowfalls.

South of an east-west line extending from Tonopah to Caliente mild winter weather is the rule rather than the exception. Throughout this great region snow-removal problems become simplified and offer few complications.

When the weather in Nevada's "frost belt" gets tough the fight to keep roads open for traffic is a strenuous one. Occasionally "Old Man Winter" pulls his punches and sends along a mild, open season, which is welcomed by highway workers. When storms rage in the mountain regions and continue, often for days at a time, all efforts to combat their forces seem futile. Nevertheless the struggle goes on and eventually the battle is won. It is seldom that any highway is snowbound and closed to traffic for a longer period than one or two days in the entire state.

Working from strategic points along the various primary routes snow-removal

(Continued on page 8)



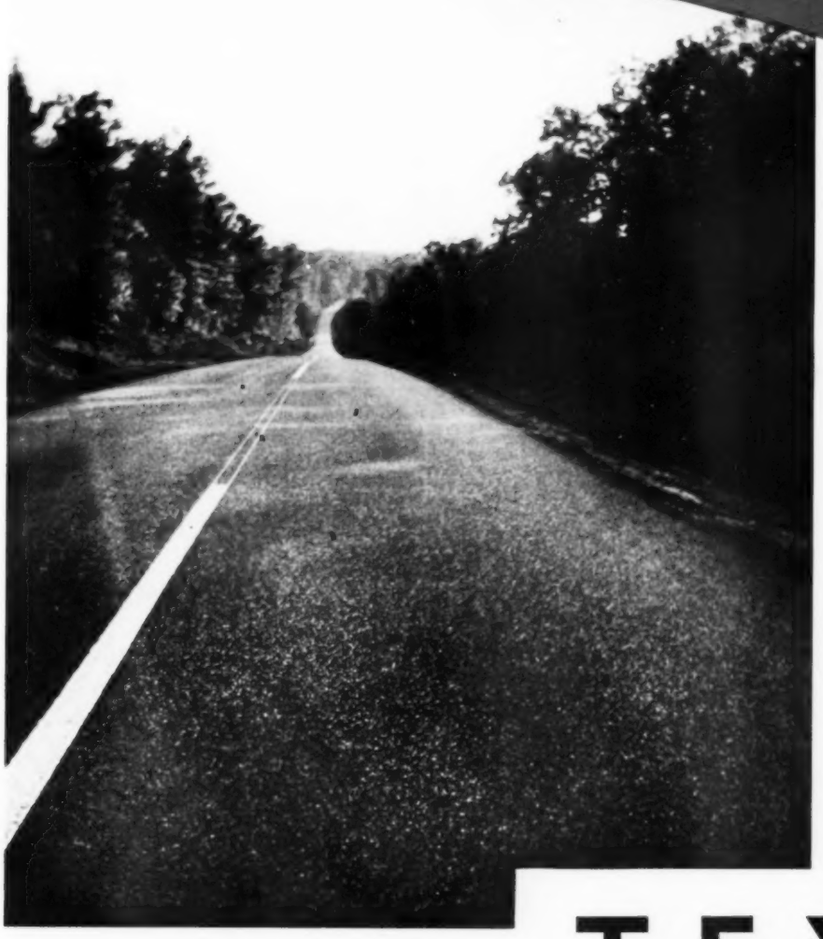
C. & E. M. Photo

**The Shuttle Train of the M-F, A, P, C & G RR Hauling Out Another Load of the Total of 2,000,000 Tons of Concrete Poured in 18 Months for Marshall Ford Dam**

**Snow in Nevada Is the Real Thing. Depths Like This on U. S. 40 Must Frequently Be Cleared from the Highways.**

# 16 miles of old road made new

## Method used by Virginia Highway Department is simple, inexpensive, effective



On the Virginia Highway Department's "must" list this year was a 16-mile section of U. S. Route 360, near Richmond.

As a wearing surface, the old road definitely was through. But a careful survey convinced Virginia engineers that it offered a sound base for a new surface.

That decided, choice of a new surface was easy. An Asphaltic Concrete top (Cold-Laid type) was spread and compacted to 1¼ inches. Note in the accompanying photograph how this easy-riding, skidproof TEXACO surface transforms the 16-mile section of U. S. Route 360. Its resilient quality insures years of service. And along with its other advantages, resurfacing with TEXACO Asphaltic Concrete is economical both in first cost and upkeep.

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## Roadside Development Here to Stay

This is a fast-moving age in which we live. Within the memory of many people living today there were no automobiles, no radios, no trans-oceanic telephones, no wireless on ships at sea. And within this same period of time we have seen this nation's highways grow from narrow dirt roads to the vast system of broad well-paved highways providing necessities and pleasure for millions.

In the process of such rapid development by any industry, it is inevitable that many potential by-products or contributing factors may be overlooked, due to the intensive concentration on the main objective. In the case of roadbuilding, this major objective was for a great many years to provide highways which would link the various sections of the country, and the communities within these sections, and our highway engineers and contractors bent their energies and ingenuity to this tremendous task. The job was to build a road—and far too often none stopped to ask whether the cost of maintaining that road in the future might be lessened if the design or methods employed were changed a bit. Certainly no one stopped to consider that the completed road might be a horrible scar across the landscape, ruining some of our natural beauty which might easily have been preserved. Concentration was on getting the roads built. And that job still isn't finished.

But somewhere along the path of years—and not very long ago, at that—people began to protest at the appearance of some of the roadsides and to talk about "beautifying" them. Engineers at first regarded this as a "sissy" movement. Theirs was a bigger and more vital task than that of planting flowers. But the germ of an important idea was there and, with the passing of the years, highway officials were faced with the excessive costs of maintaining the roads under their jurisdiction. Then the relation between these two phases of road work began to be recognized.

In writing us about our Roadside Development Awards, Roy W. Crum, Director of the Highway Research Board of the National Research Council, and one of the National Judges for the Awards, said:

"To many people roadside development means planting trees, shrubs and flowers along the roadsides. The movement may have started from that idea, but practically from the beginning highway administrators and landscape architects realized that proper treatment of the roadsides was one detail in the design of the complete highway and to them roadside development means just that—the proper use of the roadside as part of a finished whole.

"Starting from a feeling that something should be done to relieve the strictly utilitarian appearance of highways, the concept that provision for efficient use, maximum safety, economy in upkeep and pleasing appearance are all parts of the design of a highway and that proper use of that part of the right-of-way outside the traveled way could contribute greatly to all of these objectives has secured amazingly wide acceptance.

"Fortunately even in the early days of the growth of interest in the possibilities of the roadsides, far-seeing men were in charge of the groping efforts to do something. The Joint Committee on Roadside Development of the Highway Research Board and the American Association of State Highway Officials at its first meeting in 1930 charted a straight course that was well expressed by the following definition:

" 'Roadside Development must conserve, enhance, and effectively display the natural beauty of the landscape through which the highway passes as well as provide safety, utility, economy and recreation facilities by means of proper location, construction and maintenance.'

"Nowadays roadside development has gone far from the first attempts to pretty things up a bit. The use of planting is only one feature of fitting the roads into the landscape in such a way as to interfere as little as possible with the natural beauty of the countryside. Erosion control is most important, and the design and construction of ditches, side slopes and structures for maximum safety and economy of maintenance and snow control need no advocate.

"Not the least of the benefits of roadside development is that fast-spreading provision of frequent wayside areas so that a car can be gotten off the traveled way for minor repairs or for rest and refreshment. Personally, I think this detail is of vital importance."

The nominations submitted for the 1939 CONTRACTORS AND ENGINEERS MONTHLY Roadside Development Awards are concrete proof of the tremendous strides made in this phase of highway work. Photographs of completed projects indicate that highway engineers, contractors and roadside development engineers have contrived to "out-Nature" Nature herself, so that what might have been bare unsightly slopes now have a growth of shrubs and trees, sometimes with occasional outcropping of rocks, so natural that the hand of man is hard to recognize in the final result. But even more important than that, these nominations show that the future maintenance costs of highways being built today will be less than that for highways built in the past and their safety and efficiency will be greater, because the basic roadside development work, such as grading, backsloping, proper drainage, seeding and sodding, are embodied in the original contract for the construction of the highway. Roadside development is no longer "daisy planting"—it is a fundamental part of road building recognized by contractors and engineers, and will be increasingly appreciated by the vast public which travels over our highways and pays the highway bills.

**"Gee, Everything Seemed So Darn Simple Back in Engineering School!"**

## Make Traffic Marking Simple As Possible

*To the Editor*
CONTRACTORS AND ENGINEERS MONTHLY

The question of standardization for traffic-line markings is an important safety measure. As it is now, due to the numerous different designs of highway markings, motorists become uncertain as to what is expected from these markings. It has been observed by the writer that the simpler these markings are, the quicker the reaction from the motorist.

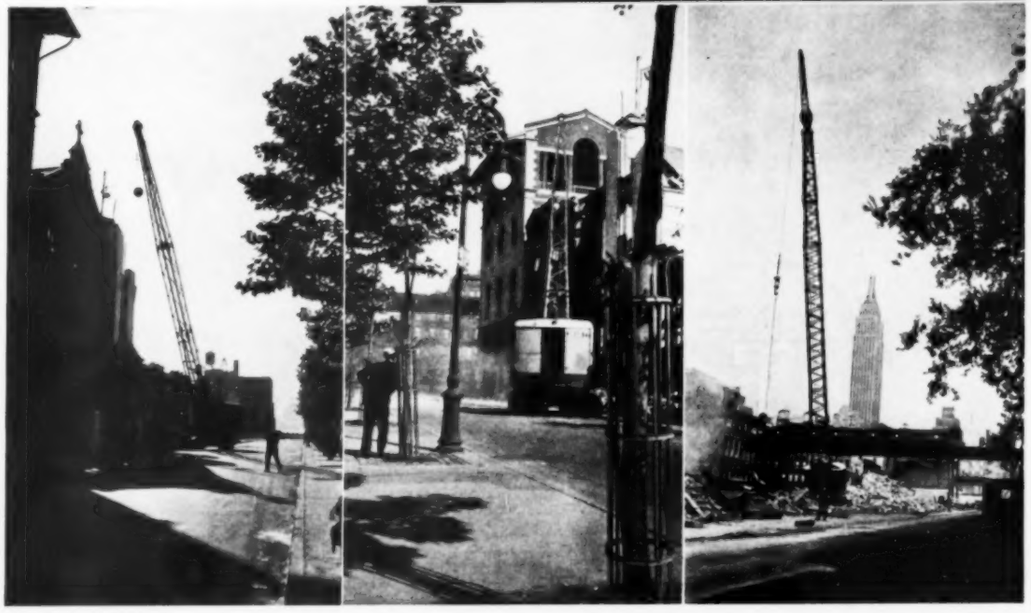
The method for traffic-line markings used in Connecticut is a solid white traffic line on all hills and curves; a broken white line in all other locations, including tangents and straight-aways. From our experimentation and observation, a broken white line consisting of 10-foot solid lines and 20-foot gaps gives the best results.

We have been having excellent results with not only our own state motorists but also out-of-state motorists observing and adapting themselves quickly to this system of pavement marking.

W. H. Sharp,
Engineer of Highway Control
Hartford, Conn.

**DESTRUCTION LEADS TO CONSTRUCTION**

**Demolishing Buildings on First Avenue Between 36th and 37th Streets, New York City, to Make Way for the Manhattan Entrance Plaza for the New Queens Midtown Tunnel Which Was Holed Through Early This Month and Which Will Be Opened to Traffic Late Next Year. See Page 2.**



### Jack Frost Will Get You If You Don't Watch Out

Outfits which will help to keep construction jobs moving and men from freezing during the winter months are described and illustrated in Bulletin M-11 recently issued by Littleford Bros., 485 E. Pearl St., Cincinnati, Ohio.

In addition to descriptions of concrete heaters, various types of salamanders and torches, this bulletin also outlines the different types of work for which these items are used.

Interested contractors and state and county highway engineers may secure copies without obligation direct from Littleford.

### Corrugated Culverts For Low-Cost Drainage

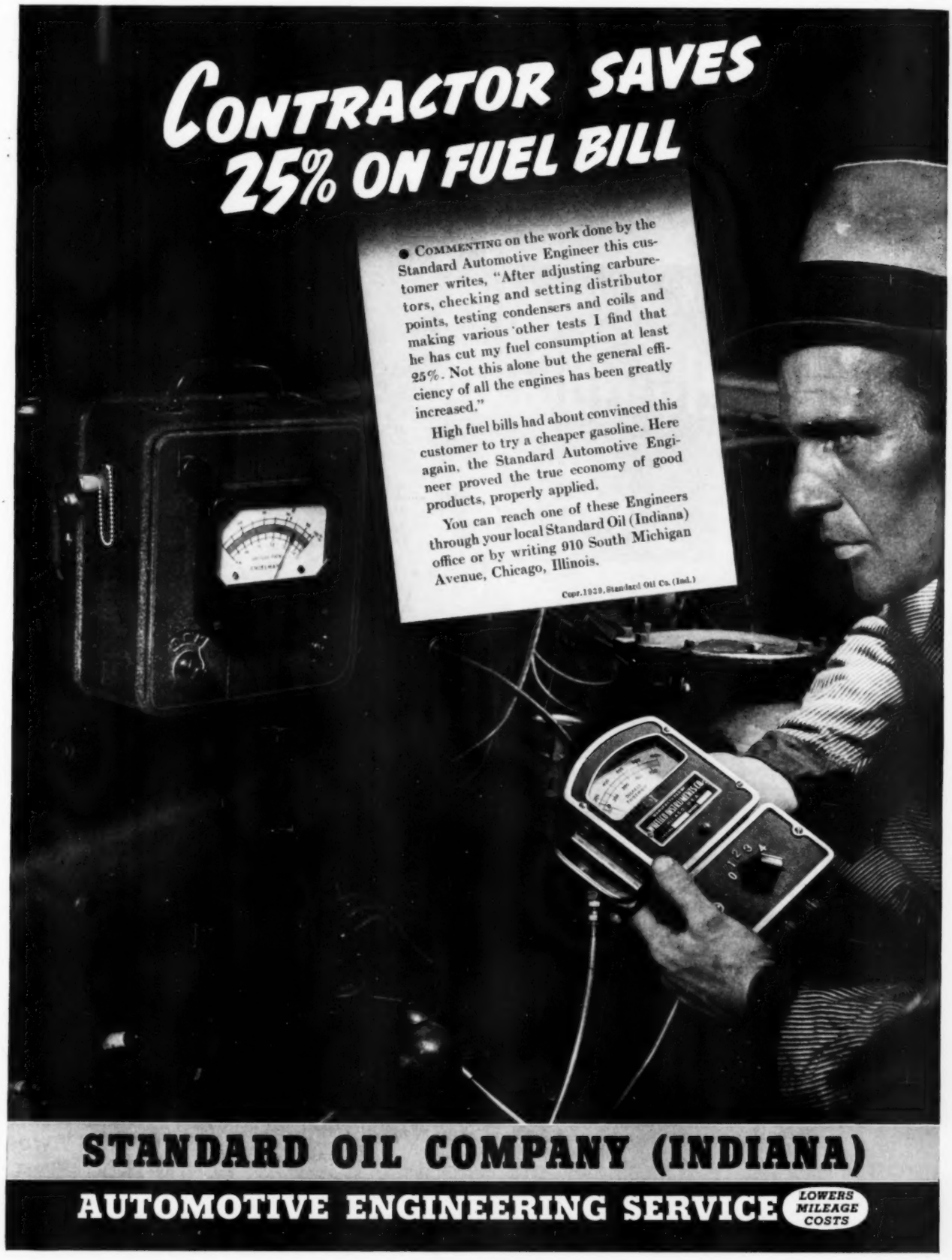
Penco corrugated metal culverts, made of the best grade of galvanized culvert sheets with 2½-inch corrugations, are described and illustrated in a 12-page booklet issued by the Penn Metal Corp. of Penna., Oregon Ave. & Swanson St., Philadelphia, Pa. In addition to standard corrugated culvert pipe, Penco bituminous coated and paved invert pipe and perforated pipe for subsoil drainage are also described.

Penco culvert comes in sections of various lengths made in multiples of 2 feet, uniformly riveted together around the circumferential joints. Diameters of 42 inches or greater are double riveted. Two or more sections of pipe can be joined together by the use of coupling bands fabricated from the same grade of metal as the pipe itself.

Copies of this booklet on Penco pipe, which is available in diameters of 6 to 96 inches, may be secured by interested contractors and engineers direct from the manufacturer or from this magazine.

### New Scraper Booklets

Two new 8-page booklets, one describing large-capacity Carryall scrapers and the other the smaller Carryalls, recently issued by R. G. LeTourneau, Inc., Peoria, Ill., and Stockton, Calif., describe and illustrate how 3 to 30-yard Carryalls handle a job from start to finish with controlled results. Copies of either or both of these booklets may be secured direct from LeTourneau.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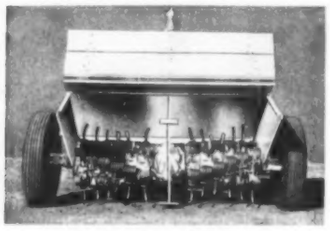

The Seaman Pulvi-Mixer

## Farm Tool Enters Road-Building Field

The importance of stabilizing highway bases and the increased amount of low-cost stabilized roads being constructed throughout the country have resulted in a number of new pieces of equipment particularly adapted to that type of highway work. One of these pieces of equipment, coming to us from the agricultural field, is the Seaman Pulvi-Mixer which has been used for tilling the soil for some time and which has proved to be equally applicable to road work.

The Seaman Pulvi-Mixer, made by Seaman Motors, Milwaukee, Wis., consists of a rotor, suspended between two independent rubber-tired wheels and driven by the rear power take-off of a tractor. This mixing rotor is comprised of forty-eight ground working tines mounted in heavy-duty double-torsion alloy springs. The rotor assembly is resiliently suspended and spring supported to permit it to tilt or rise vertically when meeting heavy obstructions. Revolving with great velocity, the rotor effects a fine pulverization of road materials and gives a uniform distribution of binder and aggregate, according to the manufacturer.

For sand or muck, a two-plow farm tractor is sufficient whereas in heavy or hard soils a three-plow tractor is recommended. It is claimed that this mixer will break up and pulverize wet packed clay to a depth of 5 inches, and that it has been used successfully to pulverize and mix a heavy cover of compost peat moss and fertilizer to a uniform depth of 10 inches. The Pulvi-Mixer has been used in soil-cement, asphalt emulsion, black-top, oil-mat, sand-clay and cut-back asphalt highway construction and it is stated that it has mixed 100 cubic yards of sand and asphalt in one hour, working with a grader.

Literature describing and illustrating the Seaman Pulvi-Mixer and its many applications in the highway construction field may be secured direct from the manufacturer by mentioning this magazine.

## New Non-Automatic Grinder for Bits

A new non-automatic detachable bit grinder, for use with all types of standard detachable rock-drill bits, has recently been announced by the Ingersoll-Rand Co., 11 Broadway, New York City. Known as the Size J-3, this Jackbit grinder has a capacity of 35 hard bits or 50 annealed bits an hour, compared with the capacity of 60 hard bits or 100 annealed bits for the Size J-5 semi-automatic grinder which was announced last spring. Both machines are available for electric, air, gasoline-engine or belt drive.

Complete information on both of these machines, as well as on two new blacksmith shop machines, the Size 500 drill steel cutter and shank grinder and the Size 4P pedestal grinder, is contained in a new illustrated 12-page folder, Form 2554, which may be secured direct from the manufacturer or from this magazine.

## New Catalog on Truck And Tractor Equipment

Dorsey Bros., Elba, Ala., manufacturer of trailers, transports, stump pullers and skidders, has recently issued a new catalog describing and illustrating its complete line of equipment. Price lists covering all models, lists of optional equipment for specific models to meet particular requirements, and complete specifications are given. Copies of this catalog may be secured direct from the manufacturer by mentioning this item.


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# Equipment Purchases Financed by Rentals

## Careful Selection of Rate Structure for Rentals, and An Inventory Value Near Insurable Value Required

By L. F. LEVIN, M. Am. Soc. C. E., County Engineer, Chippewa County, Mich.

✦ THE purchase and upkeep of equipment has been and perhaps always will be a problem to every county road organization as well as every other highway administrative unit and road contractor. How shall such original purchases be financed, depreciated, and a replacement fund set up through rents sufficient also to cover current upkeep? It sometimes becomes a problem to decide whether or not it is cheaper to rent outside equipment than to own and operate it. However, it is possible under certain circumstances to finance equipment purchases without any more cash outlay than would be necessary in hiring outside equipment.

Since 1921 the Chippewa County Road Commission of Michigan has kept reasonably accurate costs of equipment upkeep, depreciation and yearly inventory value. The equipment has included war-issue motor-vehicle equipment with solid-rubber tires, now largely replaced with recent equipment up to 5-ton capacity; tractors, rollers, graders, spring scrapers, V plows and rotary Snogos, crushers, cranes, shovels and the necessary housing for this equipment. Naturally in the intervening time the value of equipment has greatly increased in relation to its dollar value. Shop wages have varied from 45 to 60 cents an hour, and the rental rates, by being reduced year by year, have been those published by the State Highway Department.

Beginning with an approximate inventory value of $20,000, the average inventory has been $65,621.98 whereas the present inventory value is given as $101,814.12. Purchases of new equipment have averaged $18,244.75 yearly. The yearly depreciation has been $12,050, varying up and down but at an average level of 18.65 per cent whereas the average expense has been $13,250 or 20.55 per cent. This expense has included housing and heating, but not office administration. Comparing the records of the past nine years from and including 1929, the records show that the average inventory value was $85,338.18 and that the expense was averaged at $15,050 or 17.62 per cent and the depreciation at $15,870 or 18.58 per cent. The depreciation rate therefore remained fairly constant but the annual expense has shown a decreased percentage.

The rental rates have always been low enough so that the county rental, plus gas, grease, oil and wages combined was less than what other local equipment could be hired for. It was reasoned therefore that if the Commission could assess rentals against the county roads a fund could be set up from which to repair and replace equipment without additional appropriations. This set-up was started at the close of the 1928 season. Assuming that the Road Commission has been charged the $96,442.87 inventory against the equipment account, and assuming that the expense over that period of 9 years was $135,287.35 and that $184,561.26 was spent for new equipment over the same period, the total would be $416,291.48. However, the present inventory being $101,814.12, this amount is reduced to $314,477.36 which is offset by $337,262.38 in rentals. The earned increment therefore is $22,785.02, or $2,531.67 per year. The current inventory value accounts for the accumulated depreciation.

CHIPPEWA COUNTY EQUIPMENT INVENTORY AND COSTS

| Year | Inventory at Beginning of Year | Purchases | Depreciation | Inventory at End of Year | Upkeep & Repair | Rentals |
|---|---|---|---|---|---|---|
| 1938 | $101,814.12 | $36,196.41 | $22,076.79 | $115,933.74 | $20,994.52 | $53,561.89 |
| 1937 | 92,466.46 | 29,674.62 | 20,326.96 | 101,814.12 | 17,433.98 | 44,453.16 |
| 1936 | 89,974.68 | 25,367.47 | 22,875.69 | 92,466.46 | 16,807.15 | 42,624.17 |
| 1935 | 76,742.49 | 30,965.68 | 17,732.89 | 89,974.68 | 18,273.73 | 38,366.99 |
| 1934 | 74,796.95 | 16,099.23 | 14,153.69 | 76,742.49 | 15,246.51 | 41,092.23 |
| 1933 | 84,072.20 | 3,570.43 | 12,845.68 | 74,796.95 | 11,294.68 | 29,606.26 |
| 1932 | 91,750.97 | 5,054.41 | 12,733.18 | 84,072.20 | 15,965.70 | 31,477.96 |
| 1931 | 92,147.84 | 13,398.81 | 13,695.68 | 91,750.97 | 10,758.75 | 29,438.49 |
| 1930 | 96,442.87 | 22,787.86 | 27,082.89 | 92,147.84 | 16,712.93 | 41,213.61 |
| 1929 | 72,073.32 | 37,993.87 | 13,624.32 | 96,442.87 | 15,441.81 | 42,978.19 |
| 1928 | 71,214.51 | 20,671.42 | 9,812.61 | 72,073.32 | 16,783.76 | |
| 1927 | 60,482.22 | 17,448.21 | 6,715.92 | 71,214.51 | 17,396.00 | 21,200.52 |
| 1926 | 35,860.91 | 29,317.96 | 4,696.65 | 60,482.22 | 11,925.80 | 15,381.45 |
| 1925 | 30,165.19 | 10,855.72 | 5,160.00 | 35,860.91 | 10,956.81 | |
| 1924 | 28,537.26 | 8,067.93 | 6,440.00 | 30,165.19 | 7,713.34 | |
| 1923 | 27,922.80 | 6,654.46 | 6,040.00 | 28,537.26 | 8,925.16 | |
| 1922 | 30,389.72 | 3,333.08 | 5,800.00 | 27,922.80 | 10,539.34 | |
| 1921 | 24,341.17 | 11,048.55 | 5,000.00 | 30,389.72 | 3,826.40 | |
| 1920 | | | | 24,341.17 | | |
| Totals | $1,181,195.68 | $328,405.50 | $226,812.95 | $1,297,129.42 | $246,978.37 | |
| Averages | 65,621.98 | 18,244.75 | 12,600.72 | 68,269.97 | 13,721.02 | |

### What Depreciation Rate?

It makes a great difference whether

(*Concluded on page 19*)


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You'll see a lot of brand new equipment like the Lorain-80 at the Chicago Road Show, Jan. 29th to Feb. 2nd. Let's go!
THEW CENTER DRIVE

# "Traffic Must Go On" Nevada's Winter Motto

(*Continued from page 2*)

equipment is made ready for instant action as soon as the flakes begin to fall. As the snow piles up and threatens to block roads, Snogos, rotary plows, push plows, and V-plows are brought into use. This means extraordinary effort, long hours of strenuous labor, physical and mental tension and a terrific strain on the mechanical equipment, but these conditions are cheerfully accepted by the maintenance crews engaged in this public service.

Normally, traffic is carried through while the storms rage. Occasionally motorists get stalled in the drifts and experience difficulty in getting out. Snowplow crews have explicit instructions from State Highway Engineer Robert A. Allen that all such cases must be given immediate attention and service, even to the extent of towing to the nearest emergency station along any particular highway.

Snow removal operations are maintained on all improved state routes in Nevada. These include the Victory Highway, the Lincoln Highway, the Roosevelt Highway, the Arrowhead Trail, International Four States Highway and the Bonanza Highway. A greater portion of the burden of removing snow from the roads is confined to the Victory and Lincoln Highways of the east-west routes and U.S. 93 and U.S. 395 of the north-south delineations. Down in Nevada's "deep south" where the Arrowhead Trail and the Roosevelt Highway carry most of the traffic, winters are as a rule very mild and not much snow removal work is needed.

### Conditions To Be Met

The north highways are in the snow belt and subject to a great variety of snow conditions, ranging from light and dry snow to heavy, wet snow; from a fall of inches to a fall of several feet; from a slow to a rapid fall; from still air to winds of blizzard proportions. Conditions in the mountain sections require similar snow-removal operations as prevail in adjoining states but over the flatter sections where cross winds whip the snow into deep, long, continuous drifts, the problem becomes extremely difficult at times. Traffic stalls and often snow-fighting equipment gets stuck and requires help. Of course, all equipment is well provisioned so that if emergency situations arise the crews will be fairly comfortable until help arrives. All snow-removal units are equipped with heaters in the cab and a generous reserve supply of fuel is always carried on the plows. Crews have designated sections on which they work and it is seldom a piece of equipment becomes stalled at any point which is not within reasonable distance from a telephone connection.

### Methods of Operations

After experimenting with various methods of snow-removal operations to afford an uninterrupted flow of traffic, it has been determined that the following practice be established in this state. It is a very definite plan which State Highway Engineer Robert A. Allen puts into effect as soon as snow begins falling. When the snow reaches a depth of 2 to 4 inches, a push plow is started along the edge of the travel lane surface with the blade set to push the snow towards the center line and into a windrow. This is immediately attacked by either a Snogo or Rotoblade plow. These pieces pick up the snow in the windrow as well as that on the uncleared side of the roadway and cast it out and beyond the ditch lines, usually in the direction with the wind or in the direction of the prevailing winds. This operation clears a two-way lane for traffic and removes the snow to a place beyond possible barrier drifts. It is done to avoid building up an artificial snow fence which will bring about rapid and excessive drifting on the roadway.

This operation is repeated as more snow falls or is whirled on the roadway and the process is continued until the storm or wind abates.

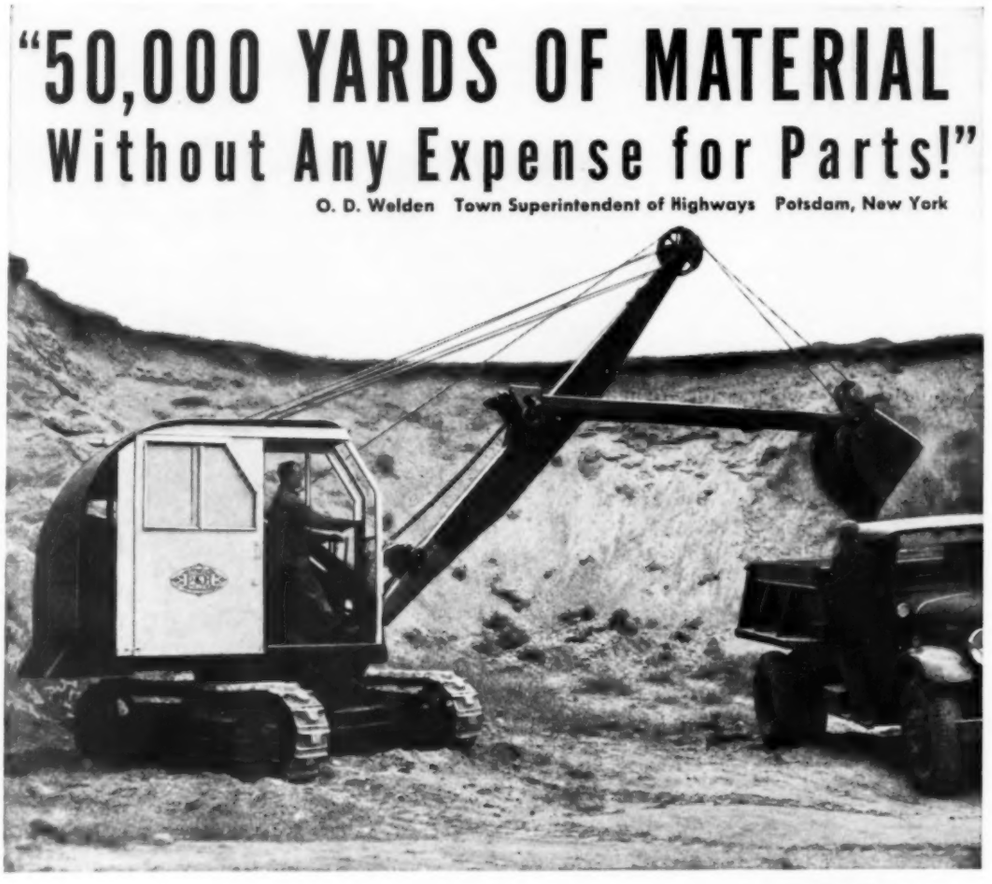
Another method used in certain flat sections of the state is to throw up a snow barrier on the unfenced lands, from 100 to 400 feet from the center line of the road by utilizing the snow itself. It is piled up by using a motor patrol or bulldozer. In addition to this scheme snow fences are also used at locations which have been predetermined through studies of snowfalls in previous years. These observations and findings are recorded from year to year and the most likely drift zones spotted and fenced.

The Nevada Department of Highways recently has adopted for use a snow fence post with lugs spaced at uniform heights on which the fence is hung. After a heavy snow when the drifts become so deep that the fence is nearly buried, maintenance crews are sent to the locations to lift the fence to the upper lugs. By taking short sections at a time a few workmen can readily elevate the fence to a new height. The posts are from 9 to 11 feet high and are carried in stock by steel fabricators.

During freezing weather ice may form on the paved surface and often this attains a thickness of from 1 to 3 inches. When this occurs a roller-disc designed for attachment to the motor patrols is swung into action and breaks up the ice. An ordinary push plow can then easily blade it to the shoulders.

In heavy drifts and cuts the accumulated snow is removed with Snogos. Where the depth of the snow is less than 2 feet the Rotoblade does excellent work

(*Concluded on page 22*)




● It takes a lot of passes to pile up 50,000 yards with a 3/8 yd. shovel . . . in fact, that's 106,255 full dipper loads! Most machines would require replacement parts during or after a job like that, but not a penny was spent for parts on this P&H Bantam Weight. Even the original hoist cable was still in use. The greater strength and rigidity of P&H machines are the results of all welded construction of tough alloy steels —the design originated by P&H more than 5 years ago and which is now "5 years ahead of the field."

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## Clearing Plaza Area

(*Continued from page 2*)

The crane equipment is owned by the Gerosa Crane Service Co., Inc., of New York City, and the Queens Midtown Tunnel is being built by the New York City Tunnel Authority. Ole Singstad is Chief Engineer and W. McK. Griffin Deputy Chief Engineer.

The contractor for the demolition work in Manhattan was M. Klotz, Inc. Seventy buildings were demolished in the blocks between 34th and 38th Streets and First and Third Avenues to make way for the construction of the Manhattan exit and entrance plazas and surface approaches of the Queens Midtown Tunnel. Most of the buildings were located between 36th and 37th Streets, where the plazas are to be constructed. The bid price for the demolition was $43,495.

The contract for the construction of the Manhattan plazas was recently let to Geo. J. Atwell Foundation Corp. at a bid price of $1,708,380.35.

The total estimated cost of the Queens Midtown Tunnel project is $58,365,000. The project is financed with a loan and grant provided by the Public Works Administration.

## New Link-Belt Officials

Richard W. Yerkes, Secretary-Treasurer of the Link-Belt Co. of Chicago, recently resigned after half a century of service with that company. He will, however, continue to serve as a member of the Board of Directors.

Harry E. Kellogg, who has been closely associated with Mr. Yerkes for the last 18 years, has been elected to succeed him as Treasurer and F. V. MacArthur, formerly Assistant Secretary, was elected Secretary. Melbourne P. Anderson, formerly General Credit Manager, has been appointed Chief Accountant to succeed Mr. Kellogg and C. W. Marum, for 28 years a member of the company's New York office, has been named General Credit Manager to succeed Mr. Anderson.

## Waring Joins Good Roads

Frank S. Waring, formerly with Walsh-Holyoke Steam Boiler Works, Inc., Holyoke, Mass., has joined the Good Roads Machinery Corp., Kennett Square, Pa., as Sales Manager of the Snow Plow Division. Mr. Waring has been directly associated with the snow-plow business since 1928.


# GET YOURSELF A *Big Discount*

## on this Winter's snow bill!

SNOW-REMOVAL is a lot cheaper than it used to be—since you can use the power and economy of "Caterpillar" Diesel equipment!

And that holds true, regardless of the falls you get—whether they're lightweights or heavyweights, hard-crusted with ice, or soft and powdery. For there's a "Caterpillar" Diesel Tractor or a "Caterpillar" Diesel Motor Grader with weight and horsepower to match anything the Winter can send!

Tremendous in its shoving-ability . . . sure-footed in its traction . . . sparing with inexpensive fuel . . . and moderate in its repair-needs, "Caterpillar" Diesel equipment is the answer to the old-fashioned, costly Winter!

And remember that these are *year-round* machines—able to pay their own way even further next Spring when it's time to recondition old roads and build new ones! See your nearest "Caterpillar" dealer or write direct for more information *before the first snow flies!*

CATERPILLAR TRACTOR CO., PEORIA, ILL.

**1** Here are the kind of drifts they have in Minnesota, and here's how they handle them—with a "Caterpillar" Diesel D8 Tractor and a LaPlant-Choate V-plow! This outfit is working 24 hours a day on only 30c worth of fuel an hour. Combine that low cost with power to buck the big drifts and stamina to work the long shifts—and you've got Winter licked! Douglas County, 100% "Caterpillar"-equipped with tractors, motor graders and blade graders, owns this outfit.

**2** With the "Caterpillar" Diesel No. 12 Motor Grader, you've got a lot of power for heavy snow. In addition, though, you have six forward speeds up to 15 m.p.h. for covering a lot of mileage in light snow. This machine is owned by Grundy County, Illinois, and is used to maintain 60 miles of highway—working 8 hours a day on 18c worth of fuel an hour! Plenty of year-round activity for a "Caterpillar" Diesel No. 12 Motor Grader—the strongest, fastest operating, most versatile motor grader of them all.

**3** A good outfit for such town work as clearing walks and streets! This is the fast-working, economical "Caterpillar" Diesel D2 Tractor. It's equipped with a Balderson blade snow-plow. You get powerful traction as well as lots of maneuverability for close work with the "Caterpillar" Diesel D2 Tractor! Use it in the open months for other city work—in the parks, on the streets, at the dump!

**4** A great outfit for light or heavy snows! It's a "Caterpillar" Diesel No. 12 Motor Grader equipped with a V-plow and a snow wing. Working 12 hours a day, in ten-below-zero weather, this machine uses only 19c worth of fuel an hour. The V-plow can divide a deep-crusted snow, throw the two sections aside, and leave a driveable road behind. The wing is handy for clipping off and laying back the top half of shoulder banks to make the next round of pushing back easier. Owned by Douglas County, Minnesota.

**FAST STARTING WITH "CATERPILLAR" DIESELS!**

It's as easy to get going as it is to keep going with a "Caterpillar" Diesel Tractor! Your cranking is done for you by a small gasoline engine that is built into the machine as standard equipment. No long wait, no wearing effort, before you can start your day's work!

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DIESEL ENGINES • TRACK-TYPE TRACTORS • ROAD MACHINERY

A Katolight Lighting Plant and Floodlight Permitted This Caterpillar Diesel-Powered Grader to Keep Going Night and Day on an Iowa Grading Job

## Lighting Units Keep Job on 24-Hour Day

In order to keep work going on a 24-hour a day schedule, Gus Ostermann & Sons of Ocheyedan, Iowa, used five 110-volt Katolight alternating-current plants on its three diesel scraper outfits, a patrol grader and a portable high-pressure greasing outfit and thus was able to move 182,000 cubic yards of earth in 40 days. Besides operating the automatic four-cylinder air compressor, the Katolight 2,000-watt plant in the grease truck furnished current for portable drills, grinders and camp lights.

Complete information on Katolight plants, ranging in size from 300 to 10,000-watt capacity, is contained in literature which the Kato Engineering Co., 109 Elm St., Mankato, Minn., will be glad to send on request.

## Emulsion Sprayers For Highway Work

The four-wheel Tarrant hand-pump asphalt-emulsion sprayer, made by Tarrant Manufacturing Co., Saratoga Springs, N. Y., is particularly adaptable for handling maintenance patching, as the emulsion drum is mounted directly in the frame of the machine. It is also made as a power sprayer for both side-bung and end-bung drums.

After short experience, any group of operators can easily load, apply and unload an average of three to four or more drums of emulsion per hour with one of these units, because of their simplicity. The machines are mounted on four wheels, in place of the usual two wheels and a leg rest, and the wheels are of the roller-bearing balloon-tired type. The use of air pressure rather than an asphalt pump as a means of spraying eliminates the necessity for priming and the congealing which may result. Other features which the manufacturer states contribute to maximum gallonage and yardage per day are a power sprayline flushing attachment, quickly accessible large-area screens, the quick make up and breaking of hose connections without the use of tools, and sufficient pump capacity to supply two spray hoses simultaneously where ample truck service is available for the rapid application of cover stone.

Full details on Tarco asphalt-emulsion sprayers may be secured direct from the manufacturer.

## Two New Models of Steam-Vapor Cleaner

Two new models of Hypressure Jenny, the steam-vapor spray cleaner for steam-cleaning all types of construction equipment, have recently been announced by the Homestead Valve Mfg. Co., P. O. Box 30, Coraopolis, Penna.

The J-H Hypressure Jenny, available in stationary or portable models, is a super-capacity extra heavy-duty unit which develops pressure up to 150 pounds within 1½ minutes. It has a streamlined simplified design and all mechanism is on the end panel with a quickly removable cover. Features of this new unit include instant starting with electric spark ignition, Simplex-type continuous vapor flow or fully automatic nozzle control, pressure atomizing fuel-oil burner, and non-clogging heating coils. One or two guns may be used with this model.

The Model J-R, designed for heavy duty and available as a stationary or portable unit, has practically the same features as the J-H model. Both units are equipped with all necessary accessories as well as safety devices such as a manual reset motor overload cut-out, drain valves and pressure gage.

A new bulletin, describing and illustrating both of these new models as well as the medium and light-duty Hypressure Jenny, may be secured direct from the manufacturer or from this magazine.

Pneumatic wheel mounted 3 H. P. gasoline engine vibrator. Can also be used for SURFACING, PUMPING, SAWING, GRINDING and DRILLING.

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Faster, Better, Cheaper
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Mall VIBRATORS

Get better bond with reinforcement—get denser and stronger concrete—eliminate aggregate pockets and expensive patching. A type and size for every job!
Send for circulars on the many gas engine, air and electric models, and let us advise you regarding the proper unit for greatest savings on your work.

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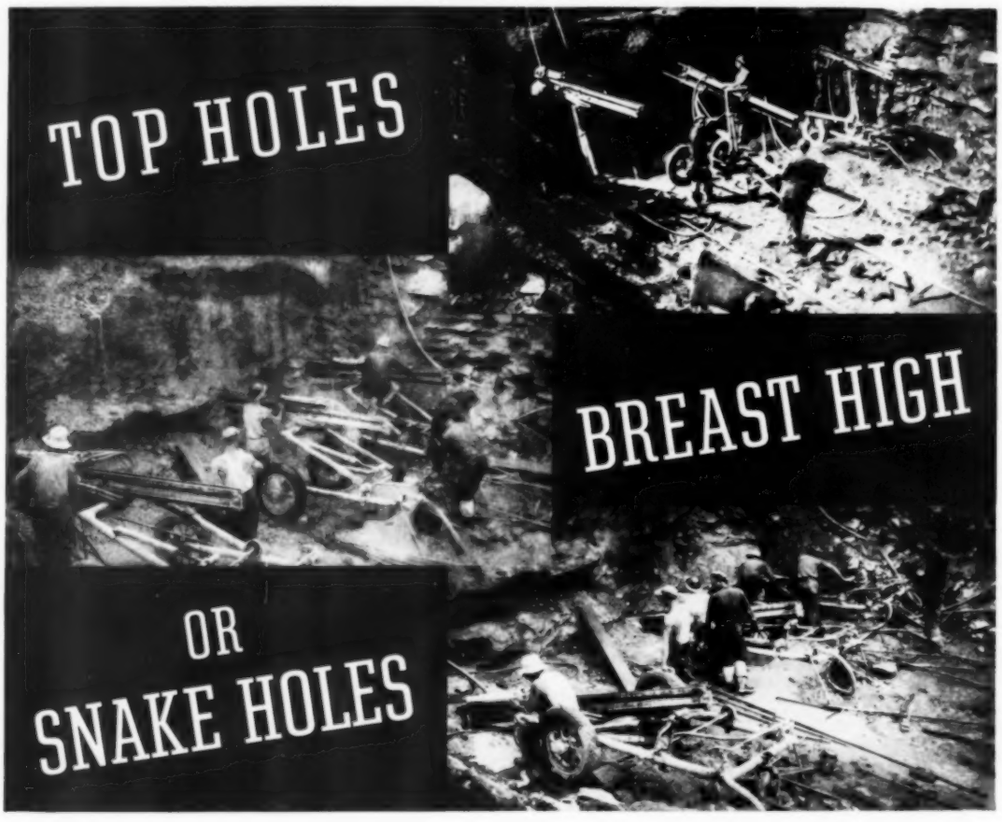


● They're all easy for the CLEVELAND DR8. With this mobile rig, setups are quickly made, in any position, for drilling in any direction. Forward leg point and handy centralizer help to keep the steel in line. Recoil device insures maximum bit penetration at every blow of the hammer. Powerful blowing keeps the hole clean. Swivelling wheels, pneumatic tired, promote fast moving from hole to hole. Taken all together, DR8 performance means less air used, fewer bits, more footage in a day, and lower cost per foot of hole drilled. Let us send new Bulletin 311, just off the press.

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# Announcing a Fast, Powerful LINK-BELT "300" Shovel SERIES

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Power—Speed—Stamina—Stability . . . these new and improved "300" series Shovels—Draglines—Cranes give you everything a contractor, engineer or master mechanic could ask for. Complete new design throughout. Many new patented and exclusive features. Built to set new standards of performance, efficiency and profitable production on job after job.

Wipe out those time losses, big maintenance bills and high production costs. These machines are specially designed and built to utilize Maximum Speed—Maximum Power—Maximum Flexibility. And that is where you save time, money and trouble on all types of jobs.

With Link-Belt's exclusive Speed-o-Matic control to step up output 25%—*at no extra cost*—and greater flexibility, you can overcome unexpected conditions without sharp drops in output.

Available in 1½ to 2 yd. capacities and easily convertible to Shovel, Dragline or Crane attachments. Readily adjustable in speeds to suit any type of work. Get full details today. Write for your Free Copy of the new "300" series catalog. Modernize your equipment for better work and better profits.

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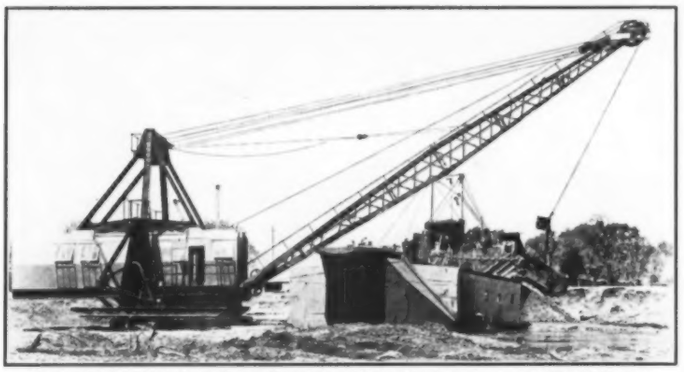

A Marion Type 7200 Walking Dragline with 100-Foot Boom and 5-Yard Bucket

## Marion Builds Walker With Many Features

A new and modern line of walking draglines, available in bucket sizes of 3 to 12 cubic yards and with booms from 80 to 200 feet in length, has just been announced by the Marion Steam Shovel Co., Marion, Ohio. The walking-type machine has some very desirable characteristics for dragline service, especially where soft ground may be encountered and where low bearing pressure and extreme mobility are necessary.

When digging, the upper frame of the machine rests on a large diameter base or tub, the bearing of which is high in comparison with that of the crawlers on the conventional dragline machines. This results in a low bearing pressure which makes the machine particularly well adapted to dragline work on soft or marshy ground. One of the features of the Marion Walker is that, at the initial stage of the walking step, suction on the tub or base is broken rapidly and the movement of the base is such as to raise it quickly and thus lower the resistance against movement of the material into which the tub may have sunk. This action is claimed to reduce the stresses to the operating parts during the period of movement which is reflected directly in low maintenance and greater mobility.

The working movement is actuated by cranks, one on each end of a large diameter shaft, which is mounted across the rotating frame and extends outward on each side. Each crank is connected to a walking "shoe" which, when the crank is rotated, makes contact with the ground to support the weight of the machine, while the dragline moves in the desired direction. This cycle is repeated, the cranks alternately raising the walking shoes, moving them forward until they make contact with the ground, and then moving the machine itself.

Features of this new line of walking draglines, which are furnished with electric or diesel power, include adequate strength to meet the digging conditions; fast drag and hoist line speeds; and rapid acceleration and high rotating speeds to assure high outputs and low maintenance.

## Highway Ice Control

Of interest to state and county highway engineers in charge of winter maintenance is a new booklet "Highway Ice Control—Methods, Materials and Equipment" recently issued by Solvay Sales Corp. This 28-page booklet gives a resumé of present ice-control practices in use in various sections of the country and, in addition, contains new facts recently developed in connection with ice-control methods.

Among other things, the book contains abstracts of reports on tests showing the differences in frictional value of cinders, sand and other abrasives, together with reports showing exactly how much the calcium chloride treatment adds to the skid-proofing effectiveness of abrasives. It also includes sections on covered vs. uncovered stockpiles; permanent vs. temporary covers; and skid-proofing vs. removal of ice.

Copies of this booklet on highway ice control may be secured without charge or obligation by interested state and county highway engineers by writing direct to the Solvay Sales Corp., 40 Rector St., New York City, and mentioning this magazine.

## Pictorial Grader Bulletin

J. D. Adams Co., Indianapolis, Ind., has available for those interested a bulletin entitled "Adams Pictorial News." It contains eight pages of interesting photographs showing various types of Adams graders at work on a diversity of jobs throughout the country, with captions giving pertinent information about the particular grader and the work it is doing. Copies may be secured direct from the manufacturer by mentioning this magazine.


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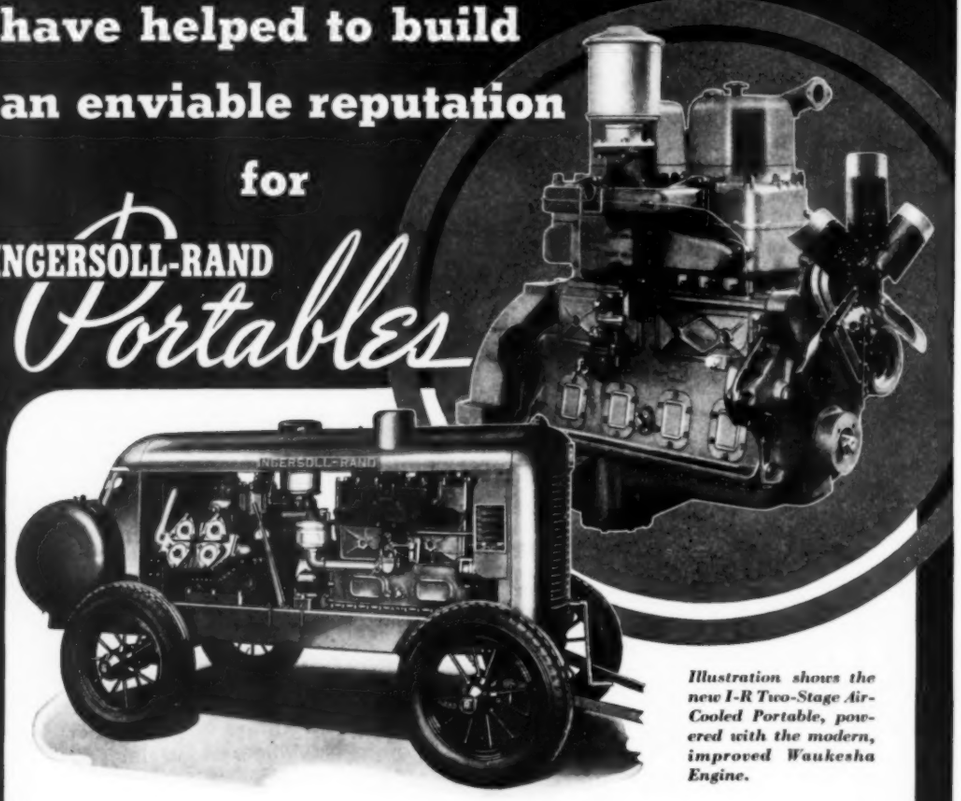


*Illustration shows the new I-R Two-Stage Air-Cooled Portable, powered with the modern, improved Waukesha Engine.*

For 27 years every Ingersoll-Rand engine-driven portable air compressor has been powered with a Waukesha Engine. A remarkable testimonial to the dependability, economy of operation, low-cost service and all 'round efficiency of Waukesha Engines, and their popularity among contractors.

Not only have Ingersoll-Rand found it highly profitable to use Waukesha power units exclusively, but leading contractors everywhere, alert to the advantages of such standardization, are demanding Waukesha Engines for their other equipment.

Waukesha gasoline and oil engines are being used on every unit of standard contracting equipment, requiring horsepowers from 8 to more than 300, including air compressors, shovels, cranes, hoists, pavers, mixers, trucks, graders, surfacers, pumps, and tractors; as well as for countless other industrial machinery applications. *Write for complete information on your power needs.*

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# Wagon Drill Fleet Speeds Excavation

## Removal of 3,000,000 Yards Of Rock at Shasta Dam in Summer Season Aided by Pneumatic Equipment

(*Photo on page 32*)

✦ OF the 3,215,000 cubic yards of excavation for Shasta Dam, the main feature of the Bureau of Reclamation's Central Valley Project in California, about 2,500,000 cubic yards of pay excavation had been accounted for by the Pacific Constructors, Inc., by July 26 of this year, plus 500,000 yards of non-pay excavation for roads, camps, etc. Overburden, consisting of earth, boulders and soft rock were removed long ago, for the contractors began operations in September, 1938. The material is now a hard blue meta-andesite, fracturing well and not especially tough on steel, although there are many hard streaks through it.

This job is characterized by the use of wagon drills on a scale perhaps greater than ever before used in dam construction. Altogether, there are 42 Ingersoll-Rand Type FM-2 drills with X-71 drifters working on both sides of the Sacramento River. The contractors have found that it pays to use this type of drill on a job of this character. On the west side, the drills are able to make 200 feet or more per drill per shift of 6 hours and 40 minutes. In this rock, the steel averages about 1 foot per change.

The rock is taken down in 20-foot lifts to start with, gradually reducing to 4 feet near the foundation of the dam. The holes are loaded according to the depth. The 20-foot spring holes, spaced 10 feet apart each way, take 50 to 60 pounds of Atlas quarry special 40 per cent explosive to the hole, used with Atlas caps, and frequently delayed from 1 up to 12 delays. These are hooked to a buzz line, using 240-volt power on the shooting line. The slick holes are loaded with Atlas 40 per cent gelatin and are fired in the same way. About ¾ pound of powder per yard of rock is required on the average.

Air for the operation of the drills is obtained from a central plant on the left abutment in which four Sullivan 2,650-cfm compressors are installed, with a 12-inch header line. There are two receivers on each side of the river, fed by 8-inch pipe lines, one line crossing the river over the contractor's bridge. Air is delivered to the working sites on both sides at 110 pounds.

### Drilling Progress

The wagon drills weigh about 1,500 pounds each on their pneumatic-tired wheels. They are easily handled by three men in the hardest locations and the set-up is almost as quick as with a jackhammer but the difference in output is very great, considering the 200 feet or more per shift with one of these drills compared with a 20-foot maximum average that could be obtained with a hammer. The holes are also larger, being 1½ to 2¾-inch gauge. On all but the deepest holes, this means less springing, which in turn reduces the cost of blasting.

The total monthly footage, working 38 drills on the average, has been running from 200,000 to 300,000 linear feet, some 40 to 60 miles of holes. During the month of May, 26 drills made an average of ½ foot each per minute, including the time for moving around and setting.

Men seem to find the operation of the wagon drills welcome labor, and the turnover in operators is small. The type of man required is the same as on jackhammer work. Mostly they have to be trained to the job. However, it is said to be easy to make a good wagon drill operator out of a chuck tender in a day or two. Furthermore, other types of mechanics who may not be needed for a time at their regular work take well to this drilling and are used from time to time, keeping them in steady work.

The Wagon Drills at Shasta Dam Work at Any Angle

In the preliminary stages, 36 Ingersoll-Rand Jackhamers were used, together with Jackbits, which could more readily be packed in to the site of the scaling operations. Drills are sharp-

(*Concluded on page 24*)

Concrete VIBRATORS
AND GRINDERS
Write for Circular on types, sizes and prices
White Mfg. Co.
ELKHART INDIANA

These famous LeTourneau "cable controlled" earth moving machines are products of R. G. LeTourneau, Inc., whose marvelous growth during the depression period is indicated by a sales boost from $127,727 in 1930 to well over $6,000,000 in 1938.

LeTourneau "CABLE CONTROL" Now Means "YELLOW STRAND CONTROL"

All LeTourneau machines are operated by wire cables through a "cable control unit" on the tractor. With LeTourneau's adoption of "Flex-Set" Preformed Yellow Strand as standard equipment, the "cable control" actually becomes "Yellow Strand Control."

Naturally, LeTourneau satisfied itself by factory tests and many field observations that Yellow Strand operates "right" and economically before adopting it as standard equipment.

A product of Broderick & Bascom, makers of nothing but wire rope for 63 years, this celebrated cable is specially designed to withstand hard usage economically. Keep your LeTourneau and other equipment at highest efficiency and economy by using "Flex-Set" Preformed Yellow Strand all the time.

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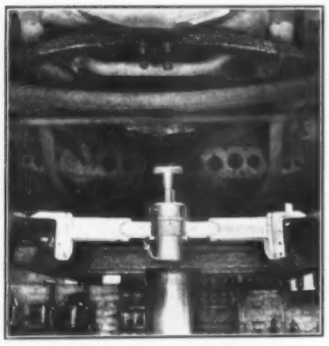

The New Alemite Pit-Lift Jack

## New Air Jack Aids Lubricating Jobs

A new air jack, made in four models, all of which are operated by compressed air, has recently been announced by the Alemite Div., Stewart Warner Corp., 1850 Diversey Parkway, Chicago, Ill. For use in fleet repair and equipment maintenance shops, this new Alemite Pit Lift Air Jack is designed to support body and engine weight so that lubricants can flow freely around all important chassis bearings, such as king pins, shackles and springs, during lubrication of the equipment. It can be used on a pit, drive-on lift or free-wheel lift and has a capacity of 1½ tons.

The jack is placed under the exact point where lifting pressure may be best applied, under an axle or chassis frame member. Air is then applied through the standard-type air-line chuck and the jack saddle elevated as much as 5 inches. In this manner the various lubrication points are relaxed and weight is removed so that lubricant can flow freely to all bearing surfaces. Front wheels may be removed for repacking with lubricant, tires may be changed without removing the piece of equipment from the lift, skid chains can be applied, and a wide variety of other lifting jobs may be handled with ease, according to the manufacturer.

Type No. 1 is for the average drive-on lifts and steel-rimmed pits; Type No. 2 for old-style safety lifts, old-style rotary lifts and concrete curb pits; Type No. 3 for steel-rimmed pits where the wheel guide curb is not strong enough to hold the weight of a car and a Z brace is furnished with the jack to give added support from the wheel track of the pit; and Type 4 is for all free-wheel lifts.

## New Catalog Describes Snow Plows and Parts

Good Roads Machinery Corp., Kennett Square, Penna., has made available to state and county highway engineers a complete thumb-indexed snow-plow catalog listing all types of snow plows, including reversible blade, V-plows, one-way plows with safety blade trip, one-way plows with safety blade release, and all manner of special plows such as tapered blade adjustments, funnel blades, and one-way shovel blades, as well as center plows. The pages are all well-illustrated and contain complete specifications including the recommended truck size for handling each plow. With this is available a complete price list of Good Roads Champion snow plows and equipment for ice and sleet control, as well as the complete list of repair parts for all models.

State and county highway engineers who wish to be prepared for this winter's snow and ice storms should secure copies of this catalog, price and parts list immediately for reference. They will be sent free on request.

## Airports from the Ground Up

Initial land clearing, leveling, finished grading, maintenance, and hangar erection as handled the world round by LeTourneau Carryall scrapers, Rooters, bulldozers and cranes, are described and illustrated in a new folder on airport construction recently issued by R. G. LeTourneau, Inc., Peoria, Ill.

Copies of this folder on how low-cost airports can be built anywhere with maximum speed and minimum expense may be secured by interested contractors and engineers direct from LeTourneau or from this magazine.


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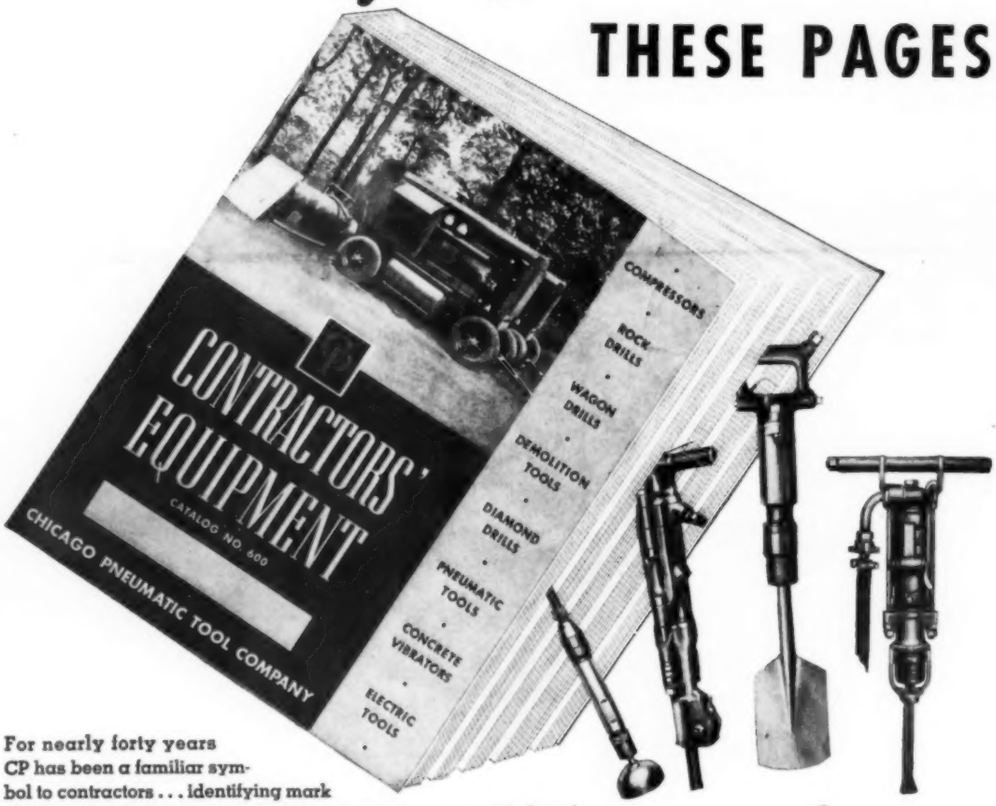
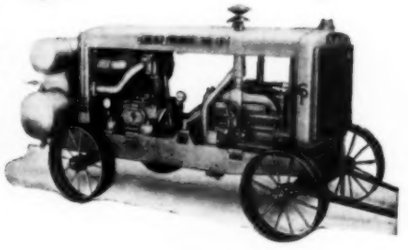




For nearly forty years CP has been a familiar symbol to contractors . . . identifying mark of dependable, low maintenance equipment . . . a reminder of Coast to Coast sales and service branches and an organization that understands the needs and problems of the contractor. » » » Catalog No. 600 — just off the press — is the latest presentation of CP Contractors' Equipment. It illustrates and describes complete lines of air compressors, pneumatic tools, rock drills, electric tools, vibrators and many other items of profit-making equipment for contractors. Write for a copy today.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### New Booklet on Rollers

The Galion Iron Works & Mfg. Co., Galion, Ohio, has recently issued an attractive and informative illustrated booklet covering its complete line of rollers. Among the features of these rollers, according to the manufacturer, are advanced design, dependable power in both gasoline and diesel units, a wide range of speeds, simplified operation, economical performance and upkeep, and a complete line enabling the selection of type and size for any requirement.

Detailed specifications and dimensions for various models are also given in this booklet, copies of which may be secured direct from the manufacturer.

### The Story of Asphalt

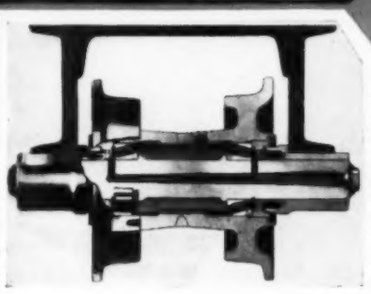
A very interesting and informative 32-page booklet on the origin, history and development of asphalt and its relation to petroleum has recently been issued as a reprint. Prepared by Joseph Rock Draney, President of the Institute from 1919 to 1925 and a former Vice President of the American Road Builders' Association, this story of asphalt appeared originally as a copyrighted article in *Americana*.

There has been no attempt to treat the subject in any technical sense, but the author has touched most interestingly on the genesis of asphalt, its sources, the men who have been important in the development of its uses, the various purposes it now serves, and a brief history of The Asphalt Institute.

Copies of this booklet may be secured by interested readers of CONTRACTORS AND ENGINEERS MONTHLY direct from The Asphalt Institute, 801 Second Ave., New York City. Price: 25 cents.

### Heavy-Duty Trucks

The Diamond T Motor Car Co., Chicago, Ill., has recently issued two catalogs on its line of motor trucks. One gives both general and individual specifications for Diamond T 1½ to 5-ton capacity Models 404, 406, 509, 612 and 614, and the other covers its extra heavy-duty line, Models 805 to 900, with maximum gross capacities of from 21,000 to 30,000 lbs. Copies of either or both may be secured by writing direct to the manufacturer and mentioning CONTRACTORS AND ENGINEERS MONTHLY.



POSITIVE-SEAL TRUCK WHEEL

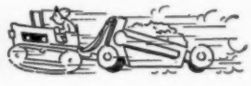
"Greatest contribution made to crawler industry in 20 years," says one large tractor fleet owner. Reasons: Eliminates daily greasing, cuts track lubrication bills 80 to 90%, increases working time, and practically eliminates costly shutdowns for truck wheel repairs.

*The Positive-Seal truck wheel assembly—built to operate 200 hours on a single lubrication—is now standard equipment on all Allis-Chalmers track-type tractors.*

* Based on the very conservative estimate of 55 cu. yds. hourly on a 500-ft. haul.

CHANGE GREASING HOURS INTO DIRT MOVING HOURS . . . .

KEEP ON MOVING DIRT . . with A-C's New POSITIVE-SEAL TRUCK WHEEL Assembly



Why take ½ hour out of every shift for greasing? The new Positive-Seal Truck Wheel Assembly on Allis-Chalmers tractors *operates 200 hours on a single lubrication.* Take a look at these figures—then estimate *your own extra profits* from this great money-making feature:

With ordinary 60-70 H.P. tractors you take ½ hour out of every 10 for greasing track rollers and idlers ... that's 500 hours in a 10,000-hour write-off period.

Now take the "S" and "S-O". With the new Positive-Seal you lubricate the front idlers and truck wheels but *once in 200 hours*... time spent on lubrication in 10,000 tractor hours is only 25 hours.

You gain 475 dirtmoving hours. With an 8-yd. Gar Wood scraper, under fair operating conditions, that's enough time to move 26,125* extra pay yards! A sweet operating margin—possible only with Allis-Chalmers tractors.

Take advantage NOW of this new profit-making feature. See for yourself how these fast-moving tractors ... with the Positive-Seal truck wheel assembly ... can increase your profits. Ask your Allis-Chalmers dealer to demonstrate ... on your own job.

ALLIS-CHALMERS POWER

TRACTOR DIVISION—MILWAUKEE, U.S.A. TRACTORS, ENGINES, ROAD MACHINERY

.. IT DOESN'T COST .. it Pays!

# 900,000 Yards of Concrete For Marshall Ford Low Dam

(*Continued from page 2*)

batching operator discharged the batches from the various weighing batchers into the hopper and turned off the light. At the extreme right at the bottom of the board was a special "whistle valve" attached to the high-pressure air line and extending into the cement bin. A quick opening of this valve "jumped" the cement and prevented arching in the bin.

From the control board the operator could see every one of the Howe dial scales attached to the individual hoppers as they were all set at the proper angles for ready vision. Also a large mirror in front of the board enabled the operator to see into the discharge hopper to see whether the previous batch had cleared. On this complete Blaw-Knox batching plant the batching gates were equipped with a single ram working on 100 pounds pressure from a 4-way valve.

As a constant and permanent check on the batches a Blaw-Knox automatic recording chart was installed at the left of the batching board and the time and sequence of delivery of the aggregates and the cement and water as well as the weight of each material was recorded by a pen for each material. The accuracy of cut-off of the materials in each batcher was indicated by the uniformity of the full weight line for each material on the indicating chart. The cement section read double to increase the accuracy of the check.

The net pounds of dry aggregate on a clean separation basis for mass concrete as mixed in the 2-yard 56-S Smith tilting mixers were as follows:

| | |
|---|---|
| Sand | 2,050 pounds |
| 3/16 to ¾-inch stone | 1,340 pounds |
| ¾ to 1½-inch stone | 1,130 pounds |
| 1½ to 3-inch stone | 1,390 pounds |
| 3 to 6-inch stone | 1,280 pounds |
| Cement | 741 pounds |
| Water | 422 pounds |

The mix proportions amounted to a 1:2.77:6.93 mix with a slump of 2¼ inches and a water cement ratio of 0.57. The contractor was unable to get all the required stone from the pits opened at the site, so about 85 per cent of the 6-inch stone and a large part of the 3-inch stone as well as a small amount of the 1½-inch stone was brought in from Burnet, Texas, by rail and handled by conveyor from the cars.

For batching the water, a 200-gallon tank above the batching floor maintained a constant head on the Blaw-Knox weighing batcher by means of a float valve. The cut-off for the weighing batcher was a 6-inch Crane globe valve operated by an air ram controlled by a solenoid and assembled on the job by the Plant Foreman.

There was a noticeable absence of dust about the batching plant which was made possible by a novel and simple device installed by the Foreman. A 15-inch steel welded pipe led from the collecting hopper for the dry batches above the mixer through a hole in the roof, carrying the dust outside the building. The steady flow of dust was aided by a small jet of air bled from the high-pressure air line used for operating the various controls in the plant.

### Mixing Equipment

The mixing equipment consisted of four 56-S Smith tilting mixers set at 90 degrees to each other around a central delivery hopper. They were pneumatically controlled for dumping by a pair of pistons on each and were driven by 40-hp General Electric motors. Each mixer was equipped with a Koehring timer which kept the tilting lever locked until the 2-minute 5-second mix was completed.

The turn head on the batcher delivery was operated by a pneumatic lever on the controls at the concrete mixer operator's stand on the floor below the batching floor. The turning of the head was started by raising the lock pin and

(*Continued on page 28*)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For Faster, Cleaner, Safer snow removal, equip with Davenport-Frink Sno-Plows. Types for every snow clearing job and every type of tractor or truck—the certain way to save time and money while doing a better job.

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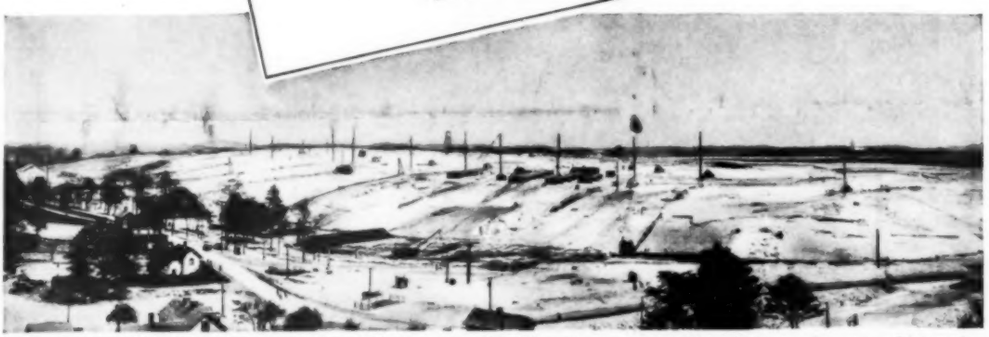
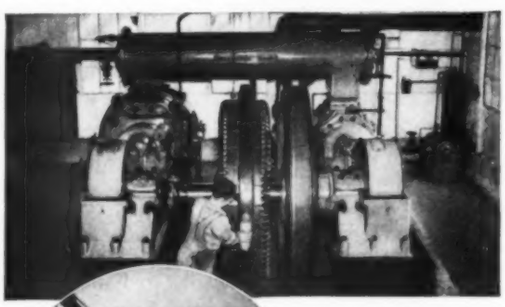
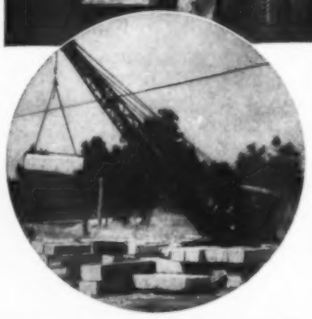


**GENERAL VIEW** of North Carolina Granite Corporation's quarry at Mt. Airy. The quarry, approximately 75 acres in extent, with 3 cutting plants, furnishes stone for schools, churches and other structures, including the $15,000,000 Arlington Memorial Bridge. All equipment from drills to compressors, saws, and locomotive cranes is kept at top condition with Texaco Lubricants.



**TWO-STAGE** Ingersoll-Rand 500 h.p. compressors. The cylinders are lubricated with Texaco Ursa Oil, have been for years.



**LOCOMOTIVE CRANES** on North Carolina Granite's property. Texaco Crater Compound is making an enviable record giving longer life, better protection to all wire rope and gears about this quarry.

THEY'RE keeping compressors working longer hours with less time out for inspection and cleaning, at the North Carolina Granite Corporation's quarry, Mt. Airy, N. C.

In spite of this hard service, valves and ports stay free from carbon accumulations, and continue to seat properly. For more than 7 years, these compressors have been lubricated exclusively with Texaco Ursa Oil. In fact, all equipment here is Texaco lubricated 100%.

You can get similar operating efficiencies by using Texaco Alcaid, Algol, or Ursa Oils.

Experienced lubrication engineers, trained in the selection and application of Texaco Compressor Lubricants, will be glad to demonstrate that savings can be made with Texaco Perfected Lubrication.

For prompt engineering service and deliveries, phone the nearest of our 2279 warehouses in the U. S., or write:

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# TEXACO

**TEXACO'S INTERESTING BOOKLET** on rock drills, their care and lubrication. 36 pages of valuable information. Plentifully illustrated. It's FREE.

**ALCAID, ALGOL and URSA OILS**

Warren E. Lovelace, Contractor, of West Springfield, Mass., Recently Purchased This New Browning B1 1-Yard Shovel. The Machine Has Chain Crowd, an 18-Foot Boom, 14-Foot Dipper Stick, and Is Powered by a Caterpillar Diesel Engine

## Roadside Awards Are Ready for the Winners

(*Continued from page* 1)

The plaques for the Sectional Award winners are of mahogany, about 11 inches high, with a silver plate suitably inscribed to indicate that the recipient made the greatest contribution to roadside development in his section of the country during the 1939 season.

The National Award, to be presented to one of the winners of the Sectional Awards who, in the opinion of three National Judges, made the greatest contribution to roadside development in the United States in 1939, is a sterling silver loving cup, 18 inches high and made by Gorham, which will also be suitably inscribed to the winner.

The response and enthusiasm brought forth by these Roadside Development Awards have been very gratifying and we have already had word that some of the states have started gathering data for next year's awards, to be sure that all the necessary material for making nominations is available when the time comes. We hope that at least a part of our aim in sponsoring these Awards has been accomplished, and we feel sure that the number of nominations indicating unusual cooperation by contractors with the state highway departments and special effort on the part of contractors in the roadside-development phase of their jobs proves that more and more contractors are keenly interested in turning over to the state highway departments highways which may well serve as monuments to their efforts.

In accepting the invitation to serve as one of the National Judges for these Roadside Development Awards, Charles M. Upham, Engineer-Director, American Road Builders' Association, said:

"Roadside development has in recent years received increasing attention from the highway profession and industry. We who build the roads are beginning to realize that it is not enough to build a broad straight thoroughfare free of outstanding traffic hazards. Consideration must also be given to the need for improving the area by the side of the road. A comparatively inexpensive highway development project may double the enjoyment of a drive along any road, as well as reduce its maintenance costs.

"In some states these facts are well recognized; in others they are relatively neglected. Any step which spotlights the importance of roadside development is a significant step forward. The success of a roadside development campaign in any state depends to a large degree upon the interest and cooperation of individual engineers and contractors. The establishment of the Annual Roadside Development Awards by CONTRACTORS AND ENGINEERS MONTHLY should therefore have especially valuable results. They will serve to arouse interest and encourage cooperation on the part of engineers and contractors throughout the forty-eight states. Contractors and engineers who have previously promoted roadside development will be stimulated to renewed efforts and contractors and engineers who have neglected this important road-building phase will be awakened by the prospect of national recognition."

## New Electric Welder Has Only One Control

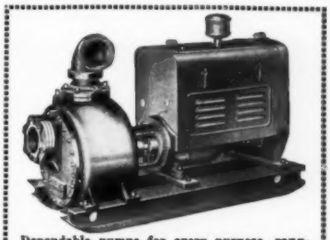
A new single-operator motor-generator arc welder, requiring only one control device for operation, has recently been announced by Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York City. Known as the Wilson Hornet, this welding machine employs for its control a single simple hand-wheel located on top of the unit. Adjustment of this hand-wheel permits the operator to obtain an infinite number of current settings. Dial markings are so accurately calibrated that meters are not required, according to the manufacturer.

Single-pole control design produces a steady current output producing a constant uniform arc at all times. It is stated that accidental reversal of polarity is impossible because the electric current is so designed that a small snap switch must be flicked by the operator to change the polarity. The Hornet is a two-bearing unit, with motor rotor and generator armature mounted on a common shaft. Adequate ventilation is furnished by propeller blades attached to the revolving shafts. Although shielded arc electrodes are recommended, the Hornet will operate with equal efficiency where bare electrodes are used.

Literature on this Wilson Hornet, which is supplied in three sizes rated at 200, 300 and 400 amperes, may be secured direct from the manufacturer.

## Jack Chambers Dies

H. H. "Jack" Chambers, Western Sales Manager for Caterpillar Tractor Co., died at Oakland, California, on October 21, after a lingering illness. Mr. Chambers, who was well known in all parts of the United States, started with the Holt Mfg. Co. in 1914 as a shop man and was later transferred to the service department. After service in the World War he became Assistant Service Manager and in 1921, Service Engineer for Holt. After a few years as a Caterpillar distributor, Mr. Chambers rejoined Caterpillar in 1928 and the next year was named Sales Manager of the Western Division at San Leandro, Calif.

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"MAN, IT'S TRUE WHAT THEY SAY ABOUT WALTER SNOW FIGHTERS!"

"It's almost unbelievable what these Walter Snow Fighters can do. Snow removal is no cinch for any truck and I had plenty of headaches before I heard of Walter Four-Point Positive Drive. At first I thought it was just a fancy name for another four-wheel drive. But what a difference! Those Walter babies finish what they start, no matter how tough the going. They have many remarkable qualities and one of the most important is their '100% Traction.' You just can't seem to stall them. Power on all four wheels is automatically proportioned according to each wheel's contact at any moment. Ordinary 4-wheel drive trucks sometimes fail to deliver the power when the footing is slippery or the going gets tough. On the other hand, the full power of the Walter is available under all conditions. We're keeping the roads open better than ever before, since we bought our Walter Snow Fighters."

*Send for literature.*

WALTER FEATURES

Torque-Proportioning Automatic Lock Differentials.

Suspended Double Reduction Drive, with Low Unsprung Weight and High Ground Clearance.

Ten to One Range Transmission with Five Forward Speeds of High Efficiency-Single Lever Control, Giving Fast High Gear and Very Powerful Low Gear for All Emergencies, with Proper Intermediate Ratios for All Operating Conditions.

Four Heavy Duty Internal Shoe Brakes, Protected from Mud, Snow and Ice. Where Required, Another Pair of Heavy Duty Shoe Brakes at Rear Wheel Hubs Is Provided.

WALTER MOTOR TRUCK CO.
1001-19 IRVING AVENUE, RIDGEWOOD, QUEENS, L. I., N. Y.

# Minnesota Adopts New Safety Traffic Lines

**Hazardous "No Passing" Zones Such As Curves and Hills Now Marked With Double Lines on Trunk Routes**

By C. L. MOTL, Maintenance Engineer, Minnesota Department of Highways

✦ A NEW center-line marking system for "no-passing" zones, similar to the system being adopted in many other states throughout the country, made its appearance on Minnesota's trunk highway system this season and has been adopted by the traveling public with surprising ease of understanding.

The center line on Minnesota highways, which is a continuous line, is either black, yellow or orange paint, depending upon the type of surface. The new method of marking consists of a white line placed alongside the normal center line. When the white line is on the driver's side of the center line, the motorist is not permitted to cross that line. However, if the white line is on the opposite side of the center line and the road is clear ahead, the center line may be crossed in overtaking a vehicle.

In the case of three-lane highways, at points where it is not safe for the driver to use the center lane for passing, the white line is painted diagonally across the center lane and then continued parallel to and on the right of the dividing line between the right-hand and center lanes.

These white lines are 4 inches wide, the same width as the continuous center line, and are placed 6 inches from the center stripe. Experience has shown that this space should be 2 inches and this will be done in 1940. Also next year the zone color will be yellow and the center line white or black. wherever reflector markers or luminous paint are used, they will be used only to emphasize these markings and such reflecting materials will be confined hereafter to the "no-passing" zone stripes. "No-Passing Zone" signs have been erected at the proper points as supplemental information.

At points where no passing is permitted in either lane of traffic, the white line appears on both sides of the center line. This system has been easy for the public to learn, since all they need to remember is that a motorist can not cross a white line if it is on his side of the center line.

### New Ruling Enforced

After sufficient time had been allowed for motorists to become accustomed to these new traffic-line markings, Elden Rowe, Chief of the State Highway Patrol, issued orders for a vigorous enforcement of the new "no-passing" zones and for the arrest of violators.

"The new white-line passing zones are so placed as to be reasonable," Chief Rowe said. "In no case do they extend for excessively and unreasonably long stretches of highway. They are placed only on stretches where visibility is obscured and attempts at passing are invitations for death or injury."

## Saw Mill Dismantled And Used for Bridge

Tearing down an abandoned saw mill, constructed 50 years ago with heavy timbers which are still in good condition, provided workable pieces for use in county bridge construction. H. E. Cornell, contractor of Boise, Idaho, who handled the job, used a method which is adaptable to a wide variety of jobs.

Using a portable 40-foot LeTourneau tractor crane, the contractor dismantled the building, carried away and spotted

Dismantling and Salvaging the Timber of an Abandoned Saw Mill in Idaho

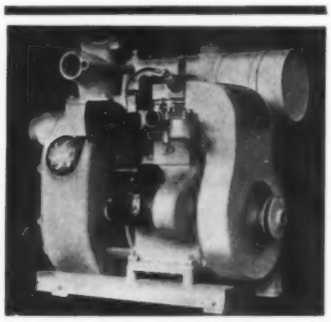
the heavy cumbersome loads where they could be prepared for further use in bridge work. Heavy trusses, such as the one illustrated, 62 x 15 feet were easily handled. Loads up to 10 tons can be quickly lifted and placed with this portable crane.

## Crushing Equipment

The complete line of Telsmith crushing equipment, including primary breakers, reduction and gyrasphere crushers, jaw and double roll crushers, grizzlies, pulsators, screens, washers, sand classifiers, feeders, bins, and complete portable and semi-portable crushing plants, is described and illustrated in the Equipment Guide E-34 of the Smith Engineering Works, 4014 No. Holton St., Milwaukee, Wis.

This guide not only describes and illustrates Telsmith equipment but also indicates the proper type of equipment for particular purposes, and contains a gravel-plant and quarry-plant questionnaire which, if filled in and sent to the company, will bring the suggestions of its engineers for the best solution to your quarry or gravel-plant problems.

Copies of Equipment Guide E-34 may be secured from the manufacturer.

**2" Light-Weight**

**High-capacity, Self-priming Pump**

Total weight 97 pounds, including 2-hp. air-cooled engine. Guaranteed self-priming up to 25'. Total head 50'. 8,000 g.p.h.

*Ask for Bulletin 22-W*

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**MARLOW PUMPS**

Ridgewood New Jersey

**Flotation for SPEED over Rough and Soft Haul Roads**

Extra large pneumatic tires provide maximum flotation for the Koehring Trail-Dump. Heap loads do not "bog down" the Trail-Dump. High speed travel is maintained because the extra large tires "float" the load over rough roads, shifting sand, soft mud . . . Hauling costs are reduced when the Koehring Trail-Dump is on the job, because traction delays are lessened, high speed is maintained, big loads are hauled. Trail-Dump pneumatic tire flotation is greater than most other hauling units.

KOEHRING COMPANY, Milwaukee, Wis.

Free swinging, vertical hanging doors have ample clearance, when open, for ability to "get off the load" when dumping. Large tires, sturdy body and high speed Koehring Tractor are additional yardage cost saving features.

HEAVY-DUTY CONSTRUCTION EQUIPMENT

A Dempster-Dumpster Owned by Walker County, Alabama

## Unit Containers Used In County Quarries

Among the various counties which have added Dempster-Dumpsters to their equipment is Knox County, Tennessee. This county, located in a fine dolomite and limestone belt, operates its own quarry where it is reported they have reduced the cost of loading and hauling broken stone by 50 per cent since installing six Dempster-Dumpsters of 1½-yard capacity equipped with six detachable containers each. When a shot is fired in the quarry, the material is thrown into a feather edge. This necessitates either a bulldozer or considerable hand work to push the material back so that dump trucks or industrial track could be used. With the Dempster-Dumpsters, the work of loading begins immediately after the shot, regardless of where the material falls. The broken stone is loaded by hand into the containers, placed at convenient spots, which are then hauled away by the truck unit with its lifting mechanism.

Fulton County, Georgia, recently installed a 2-yard Model 200LF Dempster-Dumpster with five detachable buckets of 2-cubic yard water-level capacity. The county officials were so pleased with this new equipment that it was exhibit No. 1 in a recent parade held in Atlanta.

Dempster-Dumpsters are furnished in capacities ranging from 1 to 6 cubic yards, with several different types of buckets to suit varying requirements. The Dempster-Dumpster BG model is equipped to elevate loaded containers from 25 to 35 feet below grade, according to the manufacturer, Dempster Bros., Knoxville, Tenn.

## Closed-Face Cribbing

Catalog Series A No. 2 has recently been issued by Massey Concrete Products Corp., Chicago, Ill., and 50 Church St., New York City, containing general information on closed-face concrete cribbing which is intended for use in locations where it is necessary to conceal the fill or to protect it. According to the manufacturer, Massey closed-face cribbing embodies the same principle of design as the open face. All headers and the stretchers in the rear of the wall and in the foundation are the same. Front stretchers, however, are made to close the face of the wall, except for a ½-inch space, which permits the passage of water.

Details of standard units and a typical wall section are given in this catalog which should be used in connection with Catalog Series A No. 1 when designing a closed face wall and determining the bill of units. Copies of both No. 1 and 2 or either one may be obtained direct from the manufacturer by mentioning this item, or from CONTRACTORS AND ENGINEERS MONTHLY.

## County Equipment Paid for by Rentals

(Continued from page 7)

you are a public service organization or contractor. Naturally it will make some difference then whether it is a straight out-and-out contract or one complicated with PWA and WPA clauses. If you happen to be a contractor and you are lucky enough to have a situation in which the equipment can be charged off in the first year or in the course of one contract, these figures will not interest you much, as the problem centers on the normal life of equipment in normal use. This equipment can be kept repaired and reconditioned to a point where it is outdated and obsolete. There is nothing particularly wrong with this when the rental earnings continue to exceed the annual upkeep after the depreciation is all taken care of, except that at some point further back it is possible to show that the purchase of new equipment would have maintained a higher level of rental earning. There is a balancing point where the replacement of equipment will return or maintain a fairly uniform rental return.

Depreciation can also be controlled by keeping the inventory value somewhere near its insurable value. The resale value in the used market is too unreliable to be of much help as a guide. The advantage in a compilation of figures extending over 18 years under the same supervision and approximately the same conditions is that in most cases the useful life of the equipment has been compassed several times. Consequently it shades off the peaks that would be caused by loading up with either new or old equipment.

### What Rental Rates?

In the individual case, of course, the rental rate should not be higher than that for which equipment can be hired in the open market. On the other hand, if too great dependence is placed on hired equipment, there is likely to be labor trouble and boosting of prices. Also no great and permanent gain can accrue to any organization that seeks to shop around and bargain to obtain hired equipment which does not assure a fair rate of return to the owner. Sound business can not be conducted that way. While this article deals with fleet equipment, segregation of different types is readily done for separate conclusions.

Though values are shown for upkeep, depreciation and rental on the equipment under discussion, it has not been the intention to claim that these are the proper or most economical figures. Rather it is the hope to show that such a compilation does enable a state or county highway official or contractor to determine what the rental rates should be in his particular case to accomplish the purpose at hand.

From a paper presented before the American Road Builders' Association Convention in San Francisco, March, 1939.


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MARION
WALKER FEATURES
The features described below are exclusive with the MARION WALKER

The sketch below portrays the actual step taken by the MARION WALKER. Note the forward indication of the arrow which results in breaking suction before the step is taken.

This is the STEP of the MARION WALKER

A rear view of the MARION WALKER showing how its large area base is filled all the ground for its rearward step.

The forged steel, three piece propelling shaft extends across the rotating frame and has a crank at each end. This shaft is the basis for its simple and effective propelling.

The walking traction unit of the MARION WALKER is self-contained and is located on each side of the revolving frame. It consists of a shoe, walking arm and crank.

Modernize with MARION

Where Low Bearing Pressure and Extreme Mobility are Important

MARION
WALKER
DRAGLINES

Through a new application of the walker principle of propelling, the MARION WALKER insures low bearing pressure—maximum mobility and uninterrupted service where ground conditions are impassable for regular excavating equipment. By rapidly breaking the ground suction at the initial stage of the step, the MARION WALKER is enabled to raise its huge base and secure ample clearance before the complete step is taken. It is for this important reason the MARION WALKER deserves your thorough investigation. Available with bucket sizes up to 12 cubic yards and boom lengths from 80 to 200 feet. . . . . .

THE MARION STEAM SHOVEL COMPANY
Marion, Ohio, U. S. A.

# City Streets Rebuilt During Winter Months

## Many Blocks in Richmond Repaved With Sheet Asphalt And Cold Mix on Old Blocks

### By J. R. Ford Co., Inc.

(*Photo on page 32*)

✦ RICHMOND, Va., embarked on a large resurfacing program in the fall of 1938, extending throughout the winter, and then with further PWA funds new projects were instituted, carrying the work well into the summer. The initial contract, awarded to J. R. Ford Co., Inc., of Lynchburg, Va., was for resurfacing approximately 51,000 square yards of old granite block pavement with cold mix and laying about 6,000 square yards of 2½-inch sheet asphalt on concrete base. Work started November 10, 1938, and continued through the winter until February 10, 1939. During this time temperatures ranged from 18 to 65 degrees F. Intermittent rains caused occasional shut-downs.

#### Cold Mix

The old granite spall or block pavements being resurfaced were thoroughly cleaned with a Case 4-wheel tractor driving a Detroit Harvester rotary broom mounted on the front of the tractor. On this cleaned pavement a leveling course was spread as required up to 2 inches thick, followed by a 1-inch binder course and then a ⅜-inch top course. The leveling and binder courses consisted of ¾-inch aggregate and smaller, with 4.25 per cent of asphaltic cement. The top course was mixed with ⅜-inch screened material and smaller, with 5.6 per cent of the same Trinidad Lake asphalt blend.

On wide streets two Adnun Black Top pavers 10 and 12 feet wide were used, followed by two Galion tandem rollers, a 10 and an 8-ton machine. Only two rakers were required and one set-up man with a hot tamper at the gutter line. Careful raking and rolling at the longitudinal joints at the separately spread strips eliminated any fat or hard spots. The wide rolls on which the Adnun Black Top pavers ran, and also the rolls of the power rollers, were sprayed intermittently with a hand pressure spray, using cut-back contained in an insecticide pressure tank.

The contractor purchased the liquifier type of cold mix, as well as the sheet asphalt mix, from the Natural Asphalt Corp. of Va., Richmond, Va. The temperature of the cold mix as delivered was about 110 degrees F. The hauling was done with Ford and Chevrolet trucks, with dual pneumatic tires, using an average of five trucks with 5-ton loads. The hauling was all done by the producer, the contractor buying the mix delivered to the Black Top paver.

#### Sheet Asphalt

The sheet asphalt paving was laid in two courses, consisting of a 1-inch binder of ¾-inch stone and smaller with 5 per cent Trinidad Lake asphalt and a 1½-inch top of sand with 12.5 per cent of the same asphalt. On the sheet asphalt work the haul was about 2 miles and the mix was delivered to the spreader at an average temperature of 325 F. For rolling on sheet asphalt work, a 3-wheel 10-ton Galion was used for the breakdown and an 8-ton Galion tandem for the cross rolling on the surface.

#### Latest Projects

The latest projects in this work were around North Sixth and East Clay Streets, where 7-foot concrete gutters were poured ahead of paving the remaining 26-foot granite block strips. In this work only one raker was used against the gutter, taking out the slight excess of material spread against the gutter.

#### Personnel

These contracts were operated 8 hours a day with the production running up to about 300 tons. This is not a large quantity, but the need of jumping from one section to another and also the varied temperature of the air kept down the production. The work was done for the City of Richmond, Va., under the direction of Gamble Bowers, Director of Public Works, and A. M. Harris, Chief of Streets Bureau. Sam Campbell was Superintendent for the contractor, J. R. Ford Co., Inc., of Lynchburg, Va.


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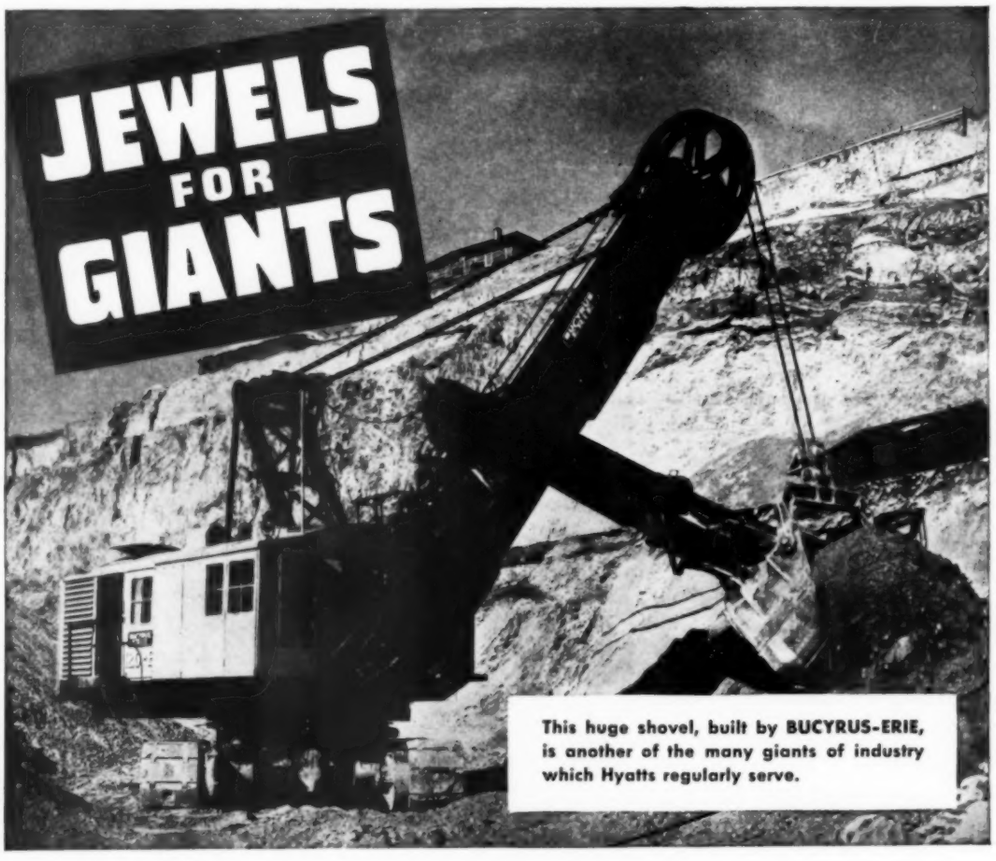
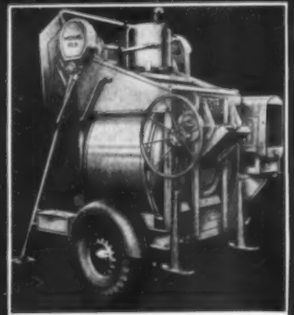


This huge shovel, built by BUCYRUS-ERIE, is another of the many giants of industry which Hyatts regularly serve.

That's just what they are—these dependable Hyatt Roller Bearings—jewels for the giants of industry. On them and around them turn the shafts, gears, and wheels which operate mechanical equipment in mill and factory, on railways and highways. Like a fully jewelled watch movement, "fully Hyatt equipped" is synonymous with better performance, greater economy and longer life. What about your equipment? Hyatt Bearings Division, General Motors Sales Corporation, Harrison, N. J., Chicago, Pittsburgh, Detroit and San Francisco.

HYATT *Roller* BEARINGS



It's a SPEEDLINE

the MODERN Mixer
—with Automotive-Type Transmission and Machined Steel Drum Tracks.
5S to 14S Alike in All But Size.
Demand these modern features plus faster charging and discharging and handy, portable end-discharge design. Catalog NT-40 gives full details. Write today.
THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, O.
JAEGER

A Homelite Portable Generator Furnishes the Power for a Skilsaw Electric Hand Saw

## Electric Current Always Available

Many contractors appreciate the value of portable electric tools, such as saws, drills and hammers, on construction jobs and know how much these tools can speed up operations and save time and labor costs. But they have hesitated to count on using such tools because of the problem of securing electricity in their frequently remote and isolated jobs.

Recently, however, the number and quality of portable generating units to provide dependable electric current for the operation of such tools have indicated that all contractors may take advantage of the savings offered by the use of electricity on the job. The portable generator has sufficient electrical output to operate most of the portable electric tools used on construction jobs, it is light and compact, can be taken anywhere on the job, and many of them can be easily carried by one man.

The portable generator unit insures longer life to the portable tool by providing an even flow of current and, with a constant flow of voltage to the tool, faster cutting is assured because the tool is operating at maximum efficiency at all times. It eliminates the voltage drop resulting from long extension cords, as well as the cost of providing the cord in the first place.

The average price of a portable generator of this type is less than $300. One must remember that a temporary installation of electricity costs from $8 to $22 in various sections of the country, the elimination of which costs goes toward the payment for the generator. In addition, there are the savings in time and labor costs resulting from the use of portable electric tools in sections where no electricity is available at all. Contractors who now use portable generator units to operate their electric saws and drills are enthusiastic boosters for this type of equipment and more and more contractors who decide to purchase such equipment are finding that the savings result in lowered job costs.

## A Portable Power Unit

Catalogs No. P39, 712 and 683 recently issued by the Blackhawk Mfg. Co., Milwaukee, Wis., contain complete information, including the price list, on its Porto-Power unit. According to the manufacturer, Porto-Power is a complete workshop on wheels, built to do 101 hard jobs on maintenance of contractors' equipment and on cars, trucks and tractors. It is economical and simple to operate. Easy hand operation generates hydraulic power and controls the action of the ram. Porto-Power hydraulic units are also adapted to bending pipe from 1 to 4-inch sizes.

Copies of these catalogs will be sent on request.

## New Blaw-Knox Vice Pres.

Announcement has been made by the Blaw-Knox Co., Pittsburgh, Penna., of the election of Lawrence E. Joseph as a Director and Vice President of the company. Mr. Joseph was recently appointed executive head of the Blaw-Knox Division.


UNION HAMMERS

BUILT FOR ANY PILING

UNION HAMMERS have a 30-year reputation for giving and taking plenty of punishment. Through the interchangeable base feature the same hammer can handle your toughest assignment in putting down I-Beams, concrete piles, wood piles or steel sheeting.

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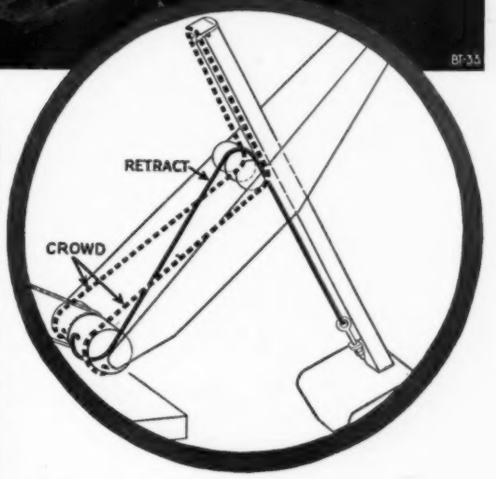
*Engineers and Manufacturers*
P. O. Box 18
ELIZABETH, N. J.

"We like the independent, twin rope crowd,"

Says
LAWRENCE CONTRACTING COMPANY




"Original twin crowd cable broke after approximately 60,000 yards and 750 hours," they continue. "Original retract cable has dug 95,000 yards and is still o.k." Both blasted rock and ordinary dirt were handled in that time. Average output in dirt has been 100 bank yards per hour. Best record in rock was 4,845 bank yards in 50 hours. In one month of 250 hours, the Lawrence machine loaded 20,016 yards of rock "which does not blast any too satisfactorily." A crowd has to be good to give performance like that. Positive and completely independent the 20-B crowd has twin ropes giving double strength where most engine power is applied. Full engine power can be used and there is plenty of crowd-power even with the loaded dipper thrust beyond the boom point. The single cable retract has 1½ times crowd-out speed, giving a digging action balanced for power, speed and complete control. Ask us for the full story on what this crowd means in output and low maintenance.

Twin crowd and single retract ropes are wound in opposite directions on a grooved drum which is rotated by a chain drive. This combination gives the most efficient, economical crowd possible. Their original crowd cable cost the Lawrence Contracting Co. $13.30, or .00022 cents per yard.

Bucyrus-Erie
SOUTH MILWAUKEE WISCONSIN

WON'T QUIT
or cause time out

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

The Hayward Company
32-36 Dey Street
New York, N.Y.

Hayward Buckets

# Nevada Snow-Removal Costs and Equipment

(*Continued from page 8*)

in throwing the snow beyond the ditch lines.

### Cost of Snow Removal

The importance and cost of snow removal in the state of Nevada is reflected in the following figures taken from department records showing this maintenance operation during the past ten years.

In 1928 it cost Nevada $3,167.50 for clearing off snow; the next year was a severe winter and the figure jumped to $16,172.05 while in 1930 the winter was equally severe and the cost was slightly increased to $19,466.28. Then came along a mild winter in 1931 and made things easy for the maintenance crews and also eased up on the state's pocketbook for it cost only $4,711.45 to keep the roads clear. But the following year, in 1932, the story is quite different. One of the severest winters experienced during the 10-year period came along and compelled the Nevada Department of Highways to spend $83,632.96 to keep the traffic moving through snow drifts and banks. A follow-up winter happened along the next year in 1933 and cost the state only slightly less than the previous year, taking $83,497.61 out of the state highway's treasure chest, to carry on the work.

To indicate the fickleness of the winter seasons in this part of the nation in 1934, it must have been almost like spring throughout the whole winter for it required only $8,227.13 to keep motorists out of the drifts. In 1935 it jumped to $28,573.76 and more than doubled this figure in 1936 and then in 1937 along came a winter which Nevada's future generations will often read about for it cost $131,066.03 to buy a couple of pieces of equipment and to dig Nevada out of the drifts. To show that the winter of 1938-39 was no piker the Department had to dig into its jeans for $59,468.88 to pay for its snow-removal work.

### Equipment

Nevada Department of Highways has listed on its records the following snow-removal equipment which it presses into service as soon as the snow begins falling during the fag-end months of the year. There are 79 trucks placed in the five divisions and 71 displacement plows which can be used on these trucks. Rotary plows have been found to be very useful in this work and the state has eight of them which can be attached to trucks for heavier snow-removal work. There are in addition three tractors, three plows for tractors, two motor graders, one Rotoblade and six Snogos.

The Snogos are, of course, put into service for the heavier work and are strategically placed throughout the state. Because of the mildness of the winters and the very light snow-removal work needed in the south, the Snogos are all kept in the north where the heavier falls require rugged and stable equipment.

Snow removal operations are carried out under the direction of State Highway Engineer Robert A. Allen, who keeps in touch with the division engineers at all times during the storm season. Constant communication with the division offices at Ely, Elko, Reno, Tonopah and Las Vegas keeps him thoroughly informed as to the progress of the work.

Engineer Allen is at the present time considering the advisability of equipping some of the heavier snow-removal equipment with short-wave radio sets adaptable to two-way communication. Because of the mildness of last winter this innovation was deferred. Progress in this method of communication, however, is being carefully watched, and if the innovation proves successful in other states it is very probable that such installations will be used in Nevada during future winter seasons.


"REX BEST IN FLOOD TEST!"

That's the report received from a superintendent who was forced to use all types and makes of pumps in the flood areas last spring. He goes on to say—"There was not a pump in the flooded districts that gave better performance, and in most cases even equaled the Rex Pumps." That's what you get when you buy Rex—the "quality-built" pumps with the wear-defying, corrosion-resisting Rex Z-Metal "Peelers" and impellers.

See why this year and every year Rex is the buy! Send for new 1939 book, "Pay Less for Pumping." Address Chain Belt Company, 1679 W. Bruce Street, Milwaukee, Wisconsin.

REX SPEED PRIME PUMPS

OVER THERE—War lords parley, swap strategy, draft battlefield blueprints, engineer devices to destroy humanity! **OVER HERE—American Road Builders prepare to meet at the Road Show-Convention to seek new ideas, to share methods, to solve problems, to plan better and safer roads for the enjoyment and advancement of mankind.**

OVER THERE—Factory wheels turn faster, workers produce instruments of death and disability, engines of destruction make their debut behind the trenches! **OVER HERE—Manufacturers of road-building materials and machinery also operate at top speed, make ready new products for preview in Chicago—equipment to build tomorrow's roads.**

OVER THERE—Selfish leaders dictate action to bring about wholesale slaughter and the doom of progress! **OVER HERE—Highway planners, designers, administrators and builders will hear Federal Works Administrator John M. Carmody, Senator Carl Hayden of Arizona, Congressman Wilburn Cartwright of Oklahoma and Public Roads Commissioner Thomas H. MacDonald in up-to-the-minute talks about construction for peace, prosperity and progress.**

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The New Shunk Blade

## New Saw-Tooth Blade Has Many Road Uses

A new type of blade, known as the Shunk Saw-Tooth ice, snow, sleet and maintenance blade, has just been announced by the Shunk Mfg. Co., Bucyrus, Ohio. This new blade, on which patents are pending, is a special grader blade with sharpened edges and with a series of teeth cut at an angle in the lower edge. The main features of these blades, which are furnished to fit all types of graders, snow plows and maintainers, are the angle of the sharpened teeth which cut or score grooves parallel with the direction of travel, and the number of teeth in each blade.

It is claimed that this new type of blade will successfully remove most hazards caused by slippery or rutted roads. Usually one trip over an icy or snow-packed highway will roughen up the road sufficiently to reduce the skidding hazard to a minimum, and two or more trips will loosen up the packed snow and ice so that a regular grader or snow plow can remove the frozen material entirely.

This same Saw-Tooth blade can be used during the remainder of the year to tear up black top, tar and macadam roads and in dirt and gravel road maintenance for eliminating washboard corrugation, ruts, ripples, chatter bumps, hollows and other irregularities.

It is reported that regular blade graders equipped with Saw-Tooth blades were used successfully in Colorado last winter to roughen and cut the snow mat, while in Michigan these blades were used extensively to score snow and ice so that mixtures of calcium chloride and sand would remain in the scoring or grooves instead of being blown or whipped off the road surface. In Texas these same blades have been used for tearing up old stabilized mats and for breaking up the top crust in road work.

A new folder describing and illustrating this new type of blade for all-year-round road maintenance may be secured by interested state and county highway engineers and contractors direct from the manufacturer by mentioning this item, or from this magazine.

## New Uses of Arc Welding

A new bulletin "101 Welding Ideas For Low-Cost Maintenance" describes and illustrates a wide variety of money-saving repair, fabrication and structural applications of arc welding. Recently issued by the Lincoln Electric Co., Cleveland, Ohio, it endeavors to show, by case studies of 101 actual maintenance jobs, just how general repair work of broken and worn parts and the fabrication of replacements, piping, jigs, fixtures, etc., are done by the electric arc process. The versatility of the process is indicated by its use in repairing parts of mild steel, high tensile steel, high manganese steel, stainless steel, chrome steel, light gauge steel, aluminum, cast iron, bronze, brass and copper, as well as applying new metal to worn parts to resist any type of wear action in service.

Procedure data, sizes of materials, and savings in weight, time and cost are given. From the great variety of jobs covered, maintenance officials will see applications in their own shops where the arc welding method of repair can be used to advantage. Copies of the bulletin may be obtained without charge direct from the Lincoln Electric Co. by mentioning CONTRACTORS AND ENGINEERS MONTHLY.


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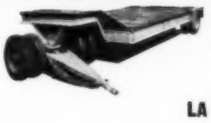

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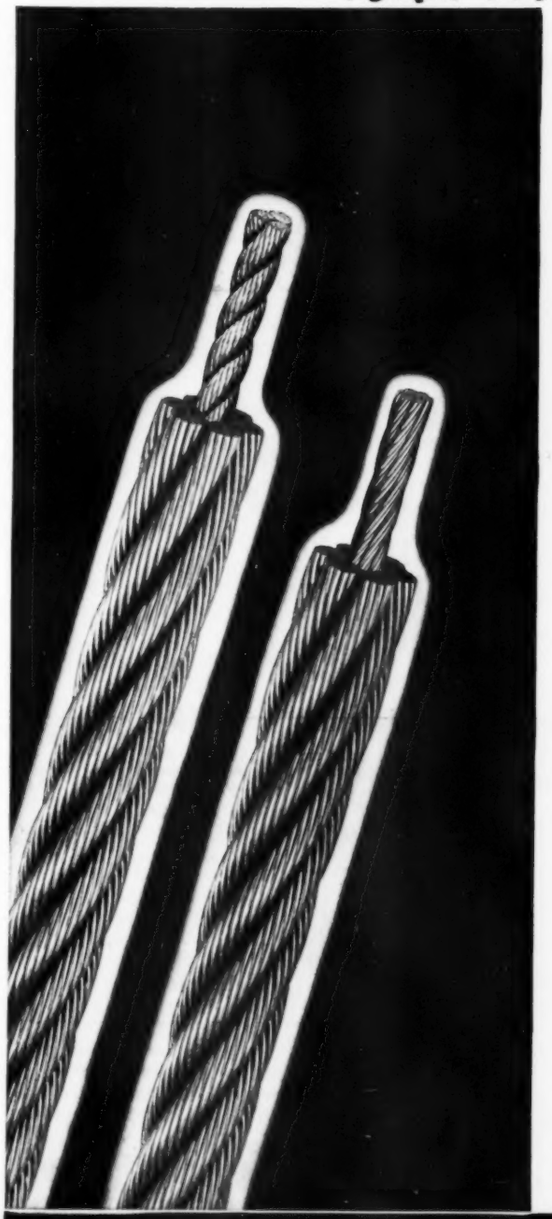
BETHLEHEM Specify FORM-SET PRE-FORMED ROPE



# A choice of 2 centers

THE real importance of centers in wire rope is not universally recognized. Steel wires, made into strands, support loads and supply the strength. But these strands must be held apart so that they won't "lock," wear and grind as they wind on drums or run over sheaves. The center or core handles this highly important job and the life of a wire rope depends on its performance as much as on that of the steel. Bethlehem offers two types of centers: the standard hemp core and the independent wire-rope center.

**Hemp.** For years this hard, tough core of hemp or other fiber has been standard in many types of ropes. The core of Bethlehem wire rope is specially lubricated with a compound that keeps the fiber pliable and resistant to moisture. This type of core is widely used in lines where highest strength and resistance to crushing is not required.

**IWRC.** For heavy loads, nothing can take the place of an independent wire-rope center. It adds to the strength of the rope. It greatly increases resistance to crushing and distortion, both on the drum and over sheaves. While the rope is stiffer to handle, it is just as flexible under load and because of its resistance to crushing it receives less damage in running over small sheaves than fiber-center rope. Bethlehem uses a specially designed wire rope as the center, an independent rope made just as carefully and with just as great precision as the wire rope itself. It carries its own specially compounded lubricant. In Form-Set line the center is also pre-formed. Strands are accurately fitted around the center to give full, adequate bearing surface. The cost is 15 per cent more.

All Purple-Strand Form-Set wire rope is precision designed. Only the finest, premium-priced steels are used. Every step in the making of Purple-Strand is a result of half a century's study of wire-rope problems, three-quarters of a century's experience in making fine steel.

**BETHLEHEM STEEL COMPANY**

BETHLEHEM STEEL

A B-E 4½-Yard Shovel Loading to 25-Yard Dump Trucks at Shasta Dam

## Handling Big Rocks At Shasta Dam Site

(*Continued from page 13*)

ened at two shops, each equipped with two Ingersoll-Rand 54 drill sharpeners.

Generally speaking, the progress of the excavation thus far has been without spectacular features or unusual problems. Accessibility to the job has been good, but there were power lines and similar obstructions to be removed. On each side of the canyon, arterial roadways were constructed at each 100 feet of elevation. As the hills are taken down in 20-foot lifts, roads on short ramps are run from the arteries to each working level.

Material is either wasted or classified and used for embankments. The one-way haul is seldom in excess of one mile. A large amount of the material is being used for an upstream embankment on the left abutment. Excavations are under way for the core wall on that side, the fill when completed to lie against the end of the dam and the core wall. Next to them will come an earth and rock fill, then a section of compacted rock and on the outside a rock dump fill. A considerable portion of the lower part of this embankment is already in place, the earth and rock part being compacted by a specially designed sheepsfoot roller. A similar embankment will be placed on the downstream side of the abutment.

### Excavating and Hauling Equipment

Excavating equipment used consists of five Bucyrus-Erie shovels, including two electric 120-B 4½-yard units, two 48-B electric 2¼-yard and one 18-B ½-yard gasoline shovels. There are eight Caterpillar RD8's with bulldozers for road making and clean-up and one Lorain gasoline truck crane.

The material is removed by a large fleet of trucks consisting of 18 new White dump trucks of 25-yard capacity, 11 7-yard A. P. Macks, and six 3-yard Fords. These are all butane powered with the exception of two of the Ford flat racks. The fleet contains, in addition, 14 1½-ton flat racks, 14 Ford ½-ton pick-ups and two International 5-ton flat racks, which are gasoline powered.

## A New Liner Plate For Small Tunnels

A new liner plate, known as Armco Light-Duty, has recently been announced by the American Rolling Mill Co., Middletown, Ohio. A companion to the company's standard tunnel liner, this new corrugated plate is designed especially for small-diameter tunnel jobs and is available in standard inside diameters of 33 to 60 inches, 10 to 14 gage inclusive.

Armco engineers say that this light but sturdy plate will meet the needs of many tunneling jobs without the added expense of the heavier plates. In this way, the exact weight of plate needed for the job can be used. The plates are interchangeable and of uniform strength from end to end.

When the tunnel liner is to be left in place, the Light-Duty plates can be supplied in galvanized iron. If even greater permanence is desirable, plates with a special bituminous coating are available.

## New 3/4-Yard Shovel

The new ¾-yard convertible excavator recently announced by the Universal Power Shovel Corp., Milwaukee, Wis., completes the line of small-sized excavators made by that company. Although of light-weight construction, the new Unit 1020 is claimed to have plenty of speed and power for heavy-duty performance. It is equipped with a 19-foot boom and 14-foot dipper stick, has 11-foot 5-inch x 20-inch crawlers running on drop forged heat-treated rollers, and all gears and bearings are fully enclosed in a dust-proof oil-tight one-piece case. The manufacturer claims that this latter feature eliminates the need for frequent greasing or adjustments, affords protection against metal-cutting abrasives, reduces friction, and prevents misalignments.

Other features of the Unit 1020 include drop-forged heat-treated alloy steel gears; full-floating shafts mounted in ball bearings; ten spline fittings throughout the main machinery case; massive double disc clutches; direct drive from the engine to the countershaft; the power unit mounted integral with the operating mechanism; the turntable mounted on four drop-forged heat-treated conical rollers; the drums mounted on short individual splined shafts; no bushings to lubricate or replace; and single screw crawler adjustment, packed in grease.

EQUIPMENT FOR CONTRACTORS

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**SPEEDY SET-UP** — New "Pull-Pins" eliminate bolts, nuts and monkey wrenches.

**LIGHT WEIGHT** — Bending frame and ram, with 4" set-up, weighs only 128½ lbs.

**ROLL TO THE JOB**—Pilot shoes also serve as wheels for rolling bender along floor.

**POWERFUL HYDRAULIC UNIT** — 20-ton all-directional ram coupled with high-pressure swivelled hose and hand operated pump (Ram also used with special attachments for pulling pulleys, gears, etc., and for wide range of heavy lift, press and push jobs).

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Close-Up of One of the Simplex Jacks Used to Provide Sloping of Forms to Exact Specifications

## Bridge Deck Forms Held by Screw Jacks

Setting forms for concreting the deck of the viaduct approach to the Meeker Avenue Bridge over Newtown Creek, Brooklyn, N. Y., presented a difficult problem because the 2,142-foot approach deck, carried on concrete columns, rises at a 3.75 per cent grade up to the bridge and has a transverse pitch of 1 inch in 10 feet for drainage. The contractor, Reiss & Weinsier, Inc., of Brooklyn, solved the problem by using 222 Simplex ball-bearing screw jacks in setting the forms to provide uniform longitudinal and transverse slope. The jacks were seated on temporary brackets of welded construction which were bolted to the vertical columns.

After the forms were placed, the jacks were raised or lowered as necessary to provide the proper pitch. Each jack was fitted with a set of malleable iron plates welded to the base and to the cap so that each jack could be bolted to a bracket as well as to the 16-inch I beam which it supported. The caps of these jacks normally have a 9-degree "float" which took care of lateral tilt in placing the forms. Each jack provided a vertical adjustment of 5½ inches for the form and each had a rated capacity of 20 tons, with a factor of safety of 50 per cent. After the forms were stripped, the jacks were removed, the brackets unbolted and the bolt holes grouted.

Simplex jacks are made by Templeton Kenly & Co., Chicago, Ill.

*The Associated General Contractors of America will hold their Twenty-First Annual Convention in Memphis during the week of February 5.*

## Belt or Direct Drive On New Small Welder

A new small arc welding machine, designed especially for use by garages, contractors, field repair shops, and state and county highway garages or maintenance depots, has recently been announced by the Lincoln Electric Co., Cleveland, Ohio. This new welder, known as the Shield-Arc Junior, has been built for use in conjunction with an engine or electric motor drive. Shops which have such equipment available may therefore take advantage of the saving by purchasing just the welder without the power unit.

The Shield-Arc Junior, which may be used with either bare or shielded-arc type electrodes, is rated at 200 amperes and its current-range welding-duty 30-volt arc is 60 to 250 amperes. According to the manufacturer, the outstanding feature of this new welder is the system of voltage and current control, now made available for the first time on a small belt-driven machine, which permits independent adjustment of voltage and current, giving complete and separate control of arc heat and arc penetration for easy speedy welding of any job. Equipped with Class B non-inflammable insulation, the Shield-Arc Junior can be operated with relatively large-size electrodes at high average current without danger of burning out. The generator is of the single-operator variable voltage type with laminated pole pieces, with the armature mounted on a large shaft with pulley. The construction is of drip-proof arc welded steel and the welder is fitted with four steel feet welded to the base and drilled for bolting. The machine occupies a space less than 2 feet square.

## Tests and Uses of Tar Shown in Rotogravure

Eight interesting tests showing the penetrating qualities of Tarmac as a bituminous road material are illustrated in Vol. 6, No. 1 of "Koppers Tarmac Highways," an 8-page rotogravure magazine containing in addition a number of photographs of the construction of roads with Tarmac. The tests which are illustrated are also explained in sufficient detail so that similar tests can be made in any state or county laboratory.

Copies of this interesting magazine may be secured by state and county highway engineers and contractors by writing direct to Koppers Co., Tar & Chemical Div., Koppers Bldg., Pittsburgh, Pa., and mentioning this magazine.


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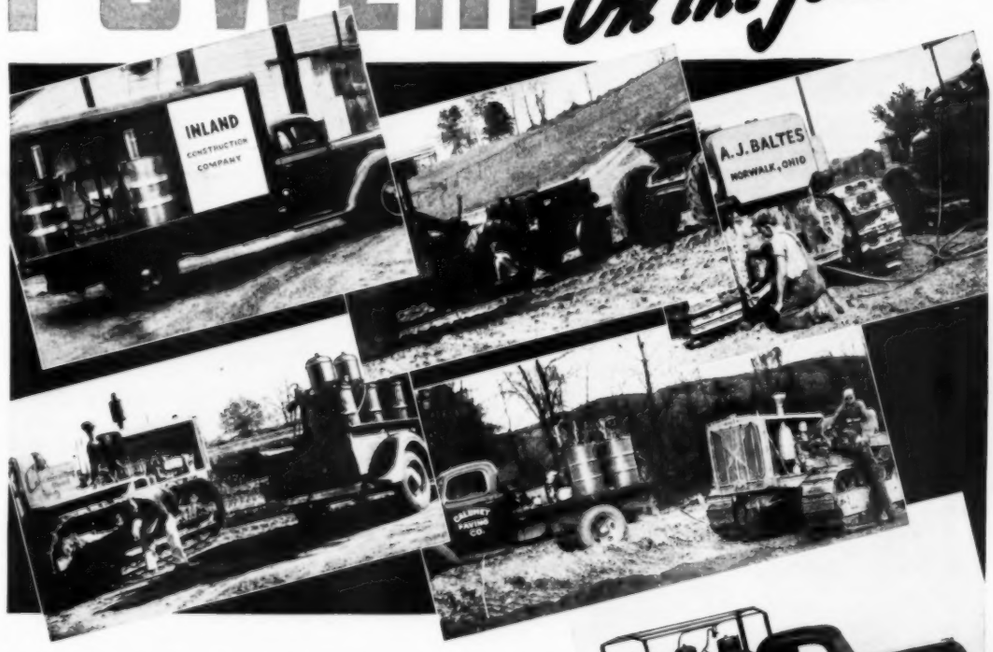


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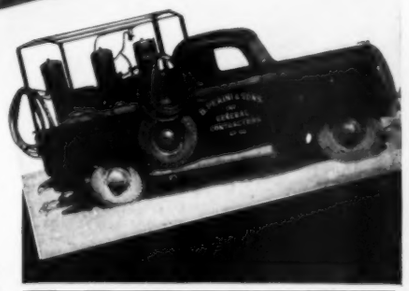

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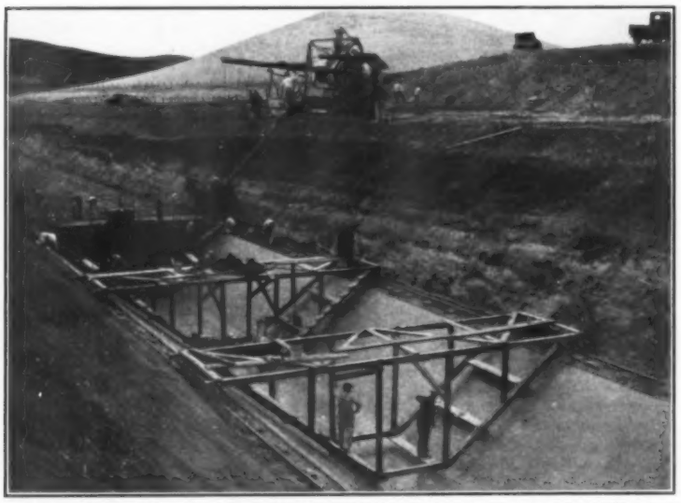

The Outfit That Pours and Finishes the Concrete Lining on the Contra Costa Canal

# Special Machines for Contra Costa Canal

(Continued from page 1)

$102,000.

Section 2, which is the subject of this article, is a concrete-lined section from Oakley to near Antioch involving 515,000 cubic yards of earth and rock excavation, a 1,360-foot tunnel with a 5-inch minimum concrete lining in horseshoe section near Neroly, eight reinforced concrete siphons, five highway bridges and several farm bridges. The canal is 25 feet wide at the water surface, 7 feet wide at the bottom, 7 feet 4 inches deep and has a 3-inch concrete lining. The canal lining required 12,400 cubic yards of concrete and 800,000 pounds of bar reinforcing. The contract for this section was awarded to Pearson, Minnis, Moody, Werner & Webb of Los Angeles, on their low bid of $340,992.20. For convenience this combination of contractors is referred to as the "P.M.W. Co." The initial capacity of 350 cfs is reduced in this section to 320 cfs at Pumping Plant No. 4, 3 miles west of Oakley. A further reduction to 291 cfs occurs in this section at a point beyond Reservoir Draw siphon.

Section 3, 8 miles in length, is concrete lined and extends from 2 miles south of Antioch to 3½ miles west of Pittsburg. It involves 650,000 cubic yards of earth and rock excavation, four reinforced concrete siphons and six highway bridges. Here the canal is 23 feet wide at the water surface, 7 feet wide at the bottom and 6½ feet deep with water. The flow diminishes from 291 to 256 cfs in this section. The 9,000-foot Los Medanos wasteway or emergency spillway from the canal to the San Joaquin River is included in this section. The contract for the construction of the entire section was awarded on December 3, 1938, to Haas, Doughty & Jones and Marshall & Stacy of San Francisco on their low bid of $316,331.50.

Four plants to raise water to an elevation of 124 feet are included in the project under a separate contract. The plants are located in Section 2 about one mile apart. Each plant will have space for six pumping units, but only four will be installed initially in each station. The contract was awarded to the Pomona Pump Co. of Pomona, Calif., for $79,300 for the pumps and motors required for the initial installation. The contractor for the construction of the stations is Geo. B. Henly Construction Co. of Ontario, Ore., who bid $130,397.

A contract for the sand and gravel for the concrete for Sections 2 and 3 was awarded by the Bureau of Reclamation on April 23, 1938, to Henry J. Kaiser Co. of Oakland, Calif., to provide 39,000 tons of gravel and 27,000 tons of sand for $35,800 f.o.b. cars at the gravel plant. The Bureau supplies the aggregates, cement and steel as well as lumber for the finished structures.

The terminal reservoir near Martinez probably will have a capacity of about 300-acre feet and will act as a balancing reservoir against sudden heavy drafts upon the canal which cannot be taken up quickly by the pumping equipment. It is not planned to maintain the reservoir at its maximum capacity at all times.

### Excavation on Section 2

The initial excavation for the canal section, which has a 1¼ to 1 slope, is handled with a 2¾-yard Lima dragline powered with a Caterpillar diesel. The cut must be made to within 10 inches of the neat line. A wooden template is used to check the cross section of the channel, setting the template on the same stakes from which the track for the trimming and lining machines is set. The template is set to give a 12-inch leeway between the rough cut and final trim. The dragline operator then tries to take off another 6 inches to reduce to a minimum the earth which must be removed by the trimming machine. At some points where it was necessary to build the bank of the canal section, the earth was carefully tamped with a sheepsfoot roller. It was noted that these sections were less liable to wash from heavy rains than the original ground. Where the canal is in through cuts a roadway berm is left at ground elevation and the spoil bank is placed beyond the roadway but within the restricted right-of-way of the canal.

The acquiring of the right-of-way for this project was a very complicated affair. In the first place the canal winds considerably, and secondly it traverses orchards, industrial sections and the yards of homes. Over 170 contracts were required to cover the right-of-way which varies from 100 to 200 feet in width.

### The Trimming Machine

Both the trimming machine and the concrete lining machines used on these contracts were designed and built by

(Continued on next page)

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MILWAUKEE, WISCONSIN THE HEIL CO. HILLSIDE, NEW JERSEY

# Progress on 46-Mile Canal in California

(*Continued from preceding page*)

Clyde Wood and leased to the contractor on a yardage basis. There have been some improvements made in the machines by the contractors, dictated by experience and also by the character of the work in certain sections.

In order to coordinate the work of the two machines used in the canal and to provide adequate bearing for their weights, a single track with a 34-foot gage is laid on each side of the canal. The track is laid on sleepers 3 x 12 inches and 20 inches long and spaced about 3 feet apart. The track is held to the sleepers by fish plate bolts and clamps. The trimming machine is self propelling by means of a pair of traction drums driven by a LeRoi 2-cylinder engine and-pulling on double lines carried ahead to a Caterpillar tractor used as an anchor. The machine rides on two wheels on either side rail.

A complete set of cutting buckets on either side trims the slope to exact grade, making a maximum cut of 10 inches, this being the clearance between the front frame of the machine and the neat slope. A Ford V-8 engine on either side pulls the line of trimming buckets which carry the material up and dump it on a transverse conveyor, thence to a vertical bucket elevator to the final disposal belt which is driven separately by a 4-cylinder LeRoi engine to handle the 50 feet of belt. This belt is an improvement on the machine as the contractor found that the original belt was not high enough. The single belt delivers to one side of the canal and can be reversed as required. This belt will move the excavated material out of a cut 25 feet deep. The contractor is required to leave 18 inches of finished berm at the top of the canal lining.

The trimming machine carries a complete acetylene welding outfit so that repairs may be made promptly in the field as the machine is frequently a long distance from any road, and cross-country hauling of repair equipment is not easy in hilly and sometimes muddy country. A hand pump on the deck of the machine is used to raise gasoline from drums rolled to the machine up to the tanks for the various gasoline engines. The trimming machine is able to cut the slopes to neat line on from 550 to 700 feet of canal a day and thus keep ahead of the lining machine which runs about 500 feet of lining a day.

### The Concrete Lining Machine

The reinforcing for the concrete lining of the Contra Costa Canal consists of ⅜-inch round bars, with the longitudinal bars spaced 12 inches and the transverse bars spaced 24 inches, on centers. The placing of the reinforcing is done under a subcontract by a crew of eight men who work on the 1¼ to 1 slopes as easily as the fabled "sidehill phimphs" of the Alps. All reinforcing must lap 40 diameters where breaks occur and the transverse steel is held from the face of the bank by concrete blocks so that it is 15/16 inch from the bank to the bottom of the steel and 1 5/16 inches from the top of the longitudinal steel to the face of the 3-inch concrete lining.

The placing of the steel is handled in a novel manner to insure the accurate placing of the bars running along the slopes before tying to the bars running up and down the slopes. T rails are placed on the slopes at intervals of 3 feet and held at the proper elevation on the slopes by hooks of reinforcing steel attached to the rails. The T rails are notched to receive the horizontal members of the reinforcing mat and then the men tie the transverse bars with the usual loops of wire. An arm of strap iron at the top of each rail is used to turn the rails when the reinforcing mat is completed and thus make it easy to withdraw the T rail.

The paving machine is pulled ahead steadily at the rate of about 2 feet per minute by a pair of ⅝-inch cables wound onto two drums which are motor driven from a Ford V-8 engine driving a Master generator. The steel frame of the machine carries the entire mechanism on the two steel rails mentioned before. Concrete is supplied to the machine by a MultiFoote 27-E paver running on the berm with its boom swung so as to deliver the concrete into a hopper car running across the bridge on a 28-inch gage track. The aggregates are dry batched and hauled to the paver in 3-batch trucks and then mixed 1½ minutes.

The hopper car is electrically driven with a power cable at the side which is automatically taken up on a reel at the center of the bridge as the car runs back and forth. The car dumps the concrete through a slotted chute running the entire length of the bridge. The concrete is placed by a series of vertical baffles held in place on vibrating shafts by rubber clamps. These baffles are placed about 1 foot apart horizontally and are the essential part of the placing method or equipment. The shafts vibrate at 1,800 per minute, consolidating the concrete and permitting it to run down the

(*Concluded on page 30*)


1869 Penco

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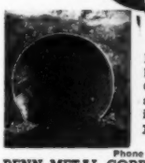

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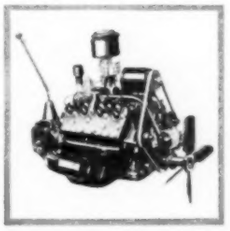
Shown here are a few important Ford features for 1940. There are many more which you're invited to see at your Ford dealer's. Make a note of them. Compare them with the features offered in other trucks of about the same price — or any price. Arrange for an "on-the-job" test and see what these features mean in performance and economy before you spend another truck dollar.

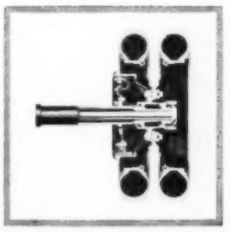
AMONG THE FORD FEATURES FOR 1940

6 wheelbases, 42 body and chassis types. New Sealed-Beam Headlamps. New, larger battery —more powerful generator. Battery Condition Indicator. Worm-and-roller steering. Straddle-mounted driving pinion — ring gear thrust plate. Needle-roller bearing universal joints. Factory-installed two-speed rear axle (at extra cost). Ford Engine and Parts Exchange Plan.

FORD MOTOR COMPANY, BUILDERS OF FORD V-8 AND MERCURY CARS, FORD TRUCKS, COMMERCIAL CARS, STATION WAGONS AND TRANSIT BUSES

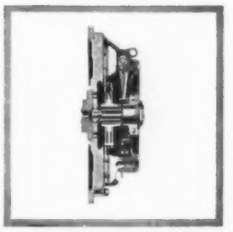


3 V-8 engines. 95, 85 and 60 hp. The only V-type, eight-cylinder truck engines on the market today.



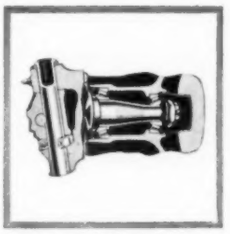
Full-floating rear axle. Relieves the axle shafts of all load stresses. Minimizes possibility of shaft failure.

Big hydraulic brakes. Unusually large brake lining area. Dependable, built to Ford standards of safety.



Semi-centrifugal clutch. Provides high power-transmitting capacity combined with low pedal pressure.

New front springs. Provide an additional point of support for frame side-members.



Rugged spindle bolt. Sturdy design for extra reliability. Spindle bolt has 1¼-in. diameter.

Worm and roller steering. Minimizes friction and greatly increases the ease of handling.

FORD V-8 TRUCKS

Regulars—One-Tonners—
¾-Tonners—
Cab-Over-Engine

# Concreting for Dam Handled by High-Line

(*Continued from page 16*)

the head turned to the next position automatically. If it was desired to skip the next mixer, the lever was held in position, keeping the pin raised. The tilting of each mixer was controlled by a separate lever. This battery of mixers with the automatic batching equipment delivered an average of 1,597 cubic yards of concrete per 8-hour shift with a record of 208 yards in one hour.

### The Contractors' Railroad

With the humor which creeps in on any well-managed job, the contractors named their 12 miles of railroad serving the job the "Marshall Ford, Atlantic, Pacific, Canadian & Gulf Railroad." It handled all materials arriving on the job.

The concrete from the mixing plant was delivered from the storage hopper at the bottom of the plant into either 4 or 8-yard Blaw-Knox roller-gate buckets carried on a single flat car. The gate for handling the concrete was operated by a 24-inch air ram. A Plymouth gasoline locomotive was the motive power for the 150-foot run of the flat car carrying the concrete buckets. The flat car was equipped with two pockets for 4-yard buckets and two for 8-yard buckets. These were formed by heavy sheet steel running the full height of the buckets so that the spotting of the buckets by the high-line was very easy. Two hook tenders attached the buckets to the high-line with a connection developed on the job. The contractor welded two ears on the sides of the tops of the buckets and took out the center beam in the buckets. A spanner on the high-line carriage had two suspender cables with double eyes which were dropped over the ears on the buckets and latched by a simple pin which had a lever on the end. The pin was inserted with the lever up and when in place the lever was turned down, locking the connection.

The short shuttle section of the contractor's railroad had carried over 2,000,000 tons of concrete in 18 months and the traffic had worn out four sets of 90-pound rails. This is believed to be some kind of a record.

### The High-Line

The high-line used on this job was one of the much-described cableways from Norris Dam. Some changes were made in it for use here, including a 187-foot stationary tail tower instead of the 110-foot movable tower used at Norris. The topography on this job required the higher tower. The head tower on the west bank of the Colorado River was 75 feet high and moved 830 feet along the bank. It contained the controls for operating the carriage. All orders were telephoned from the east bank where the buckets were picked up and reloaded onto the flat car, and from the various blocks where concreting was in progress.

The two running lines, the conveyor line and the load line, were handled by a 2-drum Lidgerwood hoist. The tower was propelled by an independent 50-hp General Electric motor connected by sprockets and gears to the wheels. Excessive tower heights were avoided by using 4-cubic yard buckets for the last 20,000 yards of concrete in the top of the dam. Thirty feet, less sag, of the main track cable was required for this smaller load, and this was sufficient to permit topping out the dam. The 3-inch American Steel & Wire Co. locked coil cable weighed about 40 tons and had a breaking strength of 550 tons. A 10-part 1⅜-inch cable was attached to the end of the 3-inch cable and a pull applied by a 1-yard crane and an RD7 tractor for raising it. The high-line span was 2,190 feet.

### Placing the Concrete

In addition to the high-line for placing concrete in the body of the dam there were two steel stiffleg derricks used in the section which could not be reached by the high-line. The larger stiffleg had a 185-foot boom and was rated at 10 tons. The second was located at the east end of the dam and carried on 85-foot boom. It was mounted on two flat cars running on tracks 40 feet apart. Two-yard buckets were trucked to this derrick from the mixing plant.

The concrete in the blocks was poured in 5-foot lifts with 72 hours between pours. In placing the concrete two Chicago-Pneumatic vibrators were used to insure dense concrete with two men to handle each vibrator. Spaders worked along the forms while the vibrators were kept toward the middle of the block.

(*Concluded on next page*)

## New Buda Branch Offices

Announcement has been made by The Buda Co., Harvey, Ill., of the removal of its New York Office from 30 Church Street to 253 W. 64th St., New York City, where Buda will maintain its offices and display rooms and in addition will have a modern machine shop, a well-stocked parts department, and ample space and facilities for the installation of Buda Lanova diesel and gasoline engines in trucks. Several factory-trained mechanics are stationed there for making these installations. Harry W. Place, formerly of the Motive Parts Co. of America, Inc., is in charge.

Concurrently The Buda Co. announced the opening of similar branches at 2929 Locust St., St. Louis, Mo., with George R. Eppes in charge; 2208 West Fort St., Detroit, Mich., with E. D. Carsten in charge; and 19 East 25th St., Chicago, Ill., with George Gibson in charge. All of these new branches have been opened in order to improve service and parts facilities for Buda users.

EFFECTIVE BLADING OPERATIONS

More than a maintenance machine, the Galion heavy duty motor patrol has full reversible blade which permits adjustments to every angle . . . for flat bottom ditching . . . for trimming shoulders . . . for bank cutting . . . for working when necessary in reverse gear.

In this one unit Galion offers a service range capable of meeting any grader requirement . . . and only one man needed to do the work. Many other features contribute to its genuine usefulness and low-cost operation. Send for engineering details.

Motor patrols
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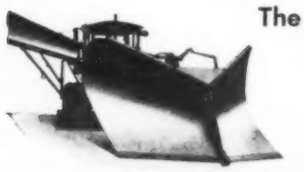

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Various technical tests and analyses, however important, simply forecast performance expectancy. *Only* actual use can prove performance.

The more than 30 years *in-the-ground* record of GOHI pipe furnishes indisputable evidence of the enduring qualities of GOHI Pure Iron-Copper Alloy — the longest-lived, low-cost ferrous culvert metal. To use GOHI pipe is to enjoy the profitable advantages of complete dependability, extra years of wear, and freedom from costly upkeep.

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GOHI CULVERT MANUFACTURERS, INC., NEWPORT, KY.

# Concrete Plant for Marshall Ford Dam

*(Continued from preceding page)*

The forms were stripped in 36 hours in winter and in 24 hours in summer. Low heat cement was used throughout the work because of the mass of the concrete. A cooling system was installed for the foundation enlargement, which was poured as a part of the low dam and will be used in the high dam when built.

The clean up between lifts was an important activity during the concreting. The surface of the lift was hand tamped with 12-inch square tampers and then from 5 to 10 hours later, when the concrete had reached just the right degree of set so that the top grout could be removed and not disturb the aggregate, a high-pressure air-water jet was used to rip the cement from the surface aggregate, leaving the surface rough enough for a good bond for the next lift. This was kept wet and rinsed until the next pour, then a ¾-inch layer of grout was spread and broomed in by hand with steel brooms just ahead of the pour. The blocks were cured for 21 days by spraying with nozzles and by hand hose. On troweled surfaces burlap was used to insure uniform distribution of the curing water and to prevent checking.

### Safety

Throughout the work at Marshall Ford Dam the contractors paid great attention to the safety of the workers. Hard hats were in evidence everywhere that there was danger from falling objects, and good walkways and strong ladders were built wherever there was climbing, particularly on the face of the dam, which made the access to work less arduous when the blocks reached their top heights. The aggregate and batching plants were also well equipped with strong wide stairways, making movement about the plants easy and safe.

### Personnel

The construction of Marshall Ford Dam is under the direction of the Bureau of Reclamation, E. A. Moritz, Construction Engineer and Charles P. Seger, Resident Engineer. For the contractors, Brown & Root, Inc., and McKenzie Construction Co., the work was under the direction of Ross White, General Manager, with E. M. Whipple, General Superintendent, M. P. Anderson, Chief Engineer, and C. L. Harmon, Foreman in charge of the concrete plant.

## New Rock Loader

The new Sullivan double-boom rock loader, recently announced by the Sullivan Machinery Co., Michigan City, Ind., eliminates the need for anchoring tail sheaves at the face or heading and is effecting considerable saving in time and labor on the 24-foot diameter diversion tunnel of the Colorado-Green Mountain Dam, according to the manufacturer.

This new rock loader provides a very flexible method for digging, conveying and loading. It is powered with a Sullivan 50-hp electric-driven three-drum scraper hauler and by means of the two tail rope drums with their ropes running through the sheaves on the booms, the scraper can be placed in any position desired for digging. When operating, an 18-foot spreader holds the booms apart.

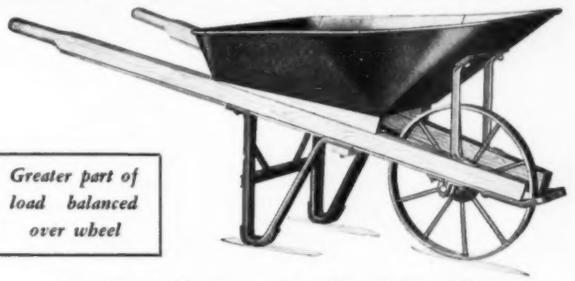
In the Green Mountain diversion tunnel an 8-foot round of 200 yards is mucked and loaded in 3 hours. The scraper reaches over the muck pile, removing first the rock close to the heading, so that drillers can drill the next round while the remaining rock is being removed. The loader operates on permanent track at from 25 to 50 feet from the heading.

The Sullivan rock loader is fully described in Bulletin 76-A, copies of which may be secured direct from the manufacturer or from this magazine.

## New Hand-Book Describes Portable Electric Hammers

The Van Dorn Electric Tool Co., Towson, Md., has just issued a comprehensive and well-illustrated hand-book giving the details of operation of the Van Dorn portable electric hammer, typical uses, a complete list of available hammer tools and their uses, and information on the maintenance and operation of the tool itself. According to the manufacturer, this book is a veritable storehouse of information for concrete, stone and brick contractors; welders; modernization contractors; tree surgeons; and maintenance men because of the many uses for the portable electric hammer in these fields. Copies may be secured from the manufacturer.


STERLING BALANCED WHEELBARROWS



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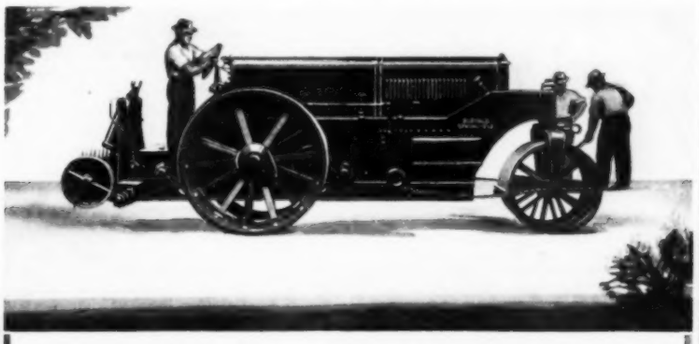

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SPRINGFIELD, OHIO

*C. & E. M. Photo*

**A Typical Highway Bridge Across a Completed Section of the Contra Costa Canal in California**

# New Lining Machine For Irrigation Canal

(*Continued from page 27*)

slope as required to fill the space for the lining. The concrete is made of ¾-inch maximum aggregate with a slump of 1¼ to 1½ inches and with a water-cement ratio of 0.56 to 0.58.

Following the placing equipment described above is a strike-off board 4 feet in width, tilted so that it compresses the concrete lining from the approximate 4-inch thickness as placed to the required 3-inch thickness. Behind the placing machine are two more heavy wood frames carrying additional metal float plates similar to those on the placing machine, but only on the side slopes. The entire weight of the frames is jacked onto the floats and the whole is pulled forward by the paving machine. During hot weather these are pulled close to the placing machine and during cold foggy weather they are run as much as 40 feet behind the machine. Behind these are two more frames with ladders down the slopes to permit the hand finishers to work easily. The floats are used behind the placing machine to smooth out undesirable irregularities.

The labor organization needed for the operation of the lining machine and its accessories is as follows:

1 concrete mixer operator
1 man dumping the dry batches at the paver skip
2 men emptying cement onto the batches less than 100 feet from the paver
1 operator for the lining machine
1 operator for the transverse hopper car
2 men cleaning the bottom and slopes of the canal ahead of placing concrete
1 man wetting the subgrade and adjusting steel
2 wood-float men filling voids immediately behind the placing machine
1 shoveler to feed concrete to float men
2 edge finishers
9 men hand-troweling and cutting the contraction grooves ¾ inch deep at 15-foot intervals. These men are divided in Group 1 of 4 men on the first float roughly troweling and cutting the grooves; Group 2 on the second float, 3 men on final finish.
3 men grease, repair and clean the machine at night, jack up the machines for the finishers to complete their work and move the machines ahead, and back for the next day
1 man adjusting jacks on machine to correct for minor variations in track
1 apprentice carpenter who acts as handy man

The lining machine is equipped with a pair of floodlights on the back to permit night finishing. During the summer this was most important, as night work was the order since it was too hot to work the concrete during daylight hours. The machine normally works 8 hours during daylight.

Curing at present is performed by the application of approved clear curing compounds and by covering the lining with burlap for a 3-day period in order to protect the lining from the direct rays of the sun.

The batching plant for the concrete aggregates consists of a pit under the spur track of the railroad with a bucket elevator carrying the aggregate to three different bins for the structures and the lining concrete. A Buffalo weighing batcher with Kron scales is used. The batches for the concrete lining consist of 1,870 pounds of gravel, 1,400 pounds of sand and 6 bags of cement. A small amount of diatomaceous earth and fine sand has been added to the lining concrete to permit greater workability with a lower slump. Both have given considerable improvement in the workability and finish of the concrete.

### Highway and Farm Bridges

The highway bridge described in these paragraphs is typical of the bridges constructed throughout the length of the canal. The bridge carries a 24-foot roadway with two 24-inch concrete curbs so that the bridge is 28 feet overall width. The roadway slab is 7 inches thick with five reinforced concrete girders 2 feet 6 inches below the slab and 15 inches wide. The end, or approach, slab is 12½ to 13½ inches thick and has no girders because of the short spans. On the bridge visited the center span is 34 feet with the end spans 18½ and 16½ feet long.

The curb, 12 inches high, carries a very simple and effective wood rail consisting of 8 x 8's set in 9-inch square holes in the curb with a 1-inch sand cushion on the bottom and grouted in. A 6 x 6-inch rail is bolted to the post 14 inches above the curb, making the top of the rail 32 inches above the deck of the bridge. A 6-inch channel is used at the two end posts to form an expansion joint in the rail. The end posts set in the approach fill are 12 x 12 and carry the wing rail.

The secondary bridges built for the farms which are traversed by the canal are designed for 10-ton loads or the equivalent of the ordinary farm truck loaded and with a reasonable factor of safety. The abutments are of concrete with ten 6 x 18-inch x 28-foot stringers carrying a floor of 4 x 12-inch x 16-foot lumber. The 6 x 6-inch posts are carried 3 feet 6 inches above the deck and have two 3 x 8-inch hub guards and a single 6 x 6-inch wheel guard or curb. The spacers for the stringers are 3 x 8-inch and the sill which is bolted to the abutment is a 6 x 8.

The contractors used 2-bag mixers for all the structure concrete and laid a 3-inch steel pipe the length of the job to supply the various mixers with water. The pipe was jointed with Victaulic joints for quick assembly and to reduce leakage.

### Other Structures

Among the other structures on this contract are five double 6-foot 6-inch x 6-foot siphons and at Reservoir Draw a siphon is 9 feet 3 inches in diameter. The warped wing walls on some of these structures required intricate form work which was well handled by a competent carpenter crew. The forms were all lined with plywood and the finished concrete was remarkably uniform, considering the small amount of concrete in each structure and the consequent small organization devoted to this work.

### Personnel

The contractors for Section 2 are Pearson, Minnis, Moody, Werner & Webb of Los Angeles, Calif., for whom Henry Werner is General Superintendent and Lawson Carrier, Foreman in charge of the trimming and lining operations. For the Bureau of Reclamation the work is under the direction of Walker R. Young, Supervising Engineer, with O. G. Boden, Division Engineer, and Richard A. Young, Field Engineer.


**For Sale or Trade**

2—18-20-yd. LeTourneau Carry-all Scrapers, excellent condition. With or without Caterpillar RD8 Tractors. Or will trade for smaller tractors and scrapers.

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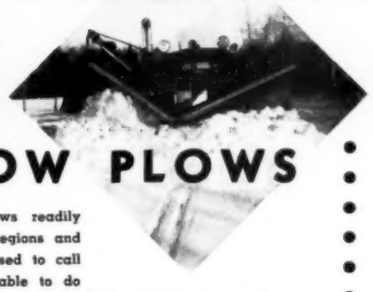

AMERICAN Medium Size Vee Plows readily handle high banks in deep snow regions and clear away snow blockades that used to call for heavier equipment. They are able to do this, in spite of their entire lack of useless dead weight, through their great structural strength and because their scientifically correct design eases the snow to the sides of the road in easily flowing streams, instead of bulling through with a lavish waste of power.

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the genuine
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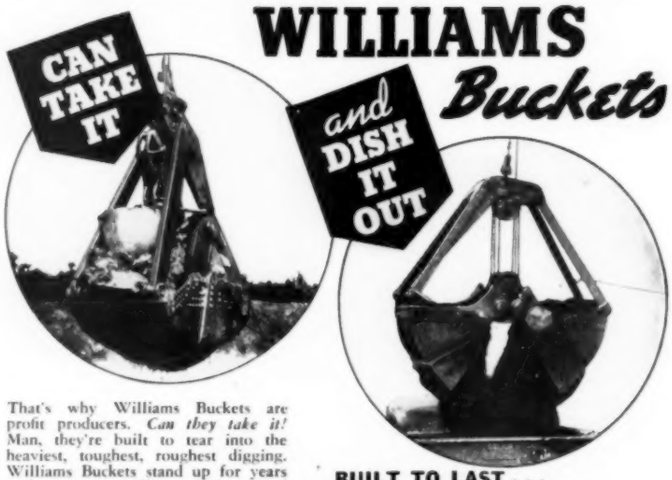

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*C. & E. M. Photo*

**Hitting the End of the Dump at High Speed and Unloading the Trac-Truk without Stopping**

# Set-Back Levee Built By Trailer Wagons

*(Continued from page 1)*

Loading was done with a Lima dragline having a 50-foot boom and swinging a 2-yard Page basket bucket. The dragline, which was powered with a Caterpillar diesel engine, worked along the edge of the pit, loading the bucket by working against the face at the side as well as behind the machine as it moved along the edge of the pit.

### Moving the Material

A fleet of five 10-yard Euclid Trac-Truks with Cummins diesel engines comprised the hauling fleet for the 3,000-foot haul. These pneumatic-tired wagons rolled up the long grade from the pit to the old levee through which they passed to the new fill at 15 miles per hour and then hit 20 mph on the level, dumping their loads at the end of the new levee at speeds as high as 18 mph. The Lima loaded and the fleet hauled about 4,000 yards of material per 24 hours. Credit for the speeds of hauling is due in large measure to the choice of equipment but the constant maintenance of the road with a Forty diesel tractor pulling a Caterpillar 44 grader was insurance of sustained hauling speeds.

The material was placed on the levee in 5-foot lifts. The levee ranged from 16 to 23 feet above ground elevation. The crew operating the outfit for a single shift of the three a day consisted of: one operator and an oiler on the Lima; five drivers for the Trac-Truks; one tractor driver and a grader man; one spotter on the dump; two laborers on drainage ditches; one mechanic and a helper.

### Accessory Equipment and Work

Ahead of building the levee the base of the section was plowed to a depth of 6 inches with teams and then the muck ditch was dug with the Lima. This was also kept ahead of the work by using the dragline on days when the hauling equipment could not be used. The muck ditch is 6 feet deep, 6 feet wide at the top and 4 feet at the bottom.

To permit the Trac-Truks to operate as rapidly as possible at the dump a D4 tractor and LeTourneau bulldozer knocked off the tops of the piles.

Lighting for the night shifts was taken care of by a Kohler 1,500-watt plant on the Lima dragline and another similar plant mounted on a platform with skids supplying current to a pair of floodlights on a wooden tower. As the end of the daylight hours approached, the tractor which maintained the dump pulled the tower and plant onto the dump. A Farmall tractor was used to run a small pump to keep water down in low spots where the levee was crossing a slough.

Diesel fuel for the operation of the hauling equipment was stored just ahead of the dump in an 800-gallon tank mounted on skids and equipped with a hand pump for fueling.

### Lubrication

In order to keep the hauling equipment in the best of condition, the contractor started about the middle of the morning to pull off one unit at a time for complete lubrication. Also whenever there was a shutdown at the pit or for rain, the equipment was fully lubricated so that it would be ready to start as soon as the shutdown was over, without any delays for maintenance. The oiler on the dragline lubricated that machine and worked almost continuously on the crawlers to keep them in good condition and reduce the speed of wear from the abrasive action of the sandy material.

### Shop and Service

A small but very efficient shop was maintained close to the work throughout the operations on this contract. The shop was about 10 x 12 feet and unusually convenient. As all ordering of spare parts was taken care of at the shop, a small wall desk was attached close to the door. The other three walls had every wrench and tool mounted on nails so that it was accessible instantly. An acetylene welding outfit consisting of a Rego torch and Linde oxygen and acetylene was located across the doorway from the desk and was used for every conceivable repair and maintenance job.

The most novel time-saving idea in the shop was the use of small salad-dressing jars for holding all small cotter pins, bolts, nuts and parts. The metal covers of the jars were nailed to the beams overhead and the jars screwed into them with the parts in plain sight through the bottoms of the jars. No hunting through a lot of cardboard boxes or metal tool boxes for the needed small part here—it was right in sight all the time with no "pawing" to get it out of an odds-and-ends box.

### Personnel

The construction of the new levee was awarded to the Driver Co. of Memphis, Tenn., as Item R 705.8 for 17.58 cents per yard for 650,000 yards or a total of $114,270. The work was done under the direction of J. M. Schumpert as Superintendent and with T. R. Keith as Master Mechanic. For the U. S. Engineer Department the work was under the direction of Lieut.-Col. William F. Tompkins, District Engineer, Second New Orleans District.

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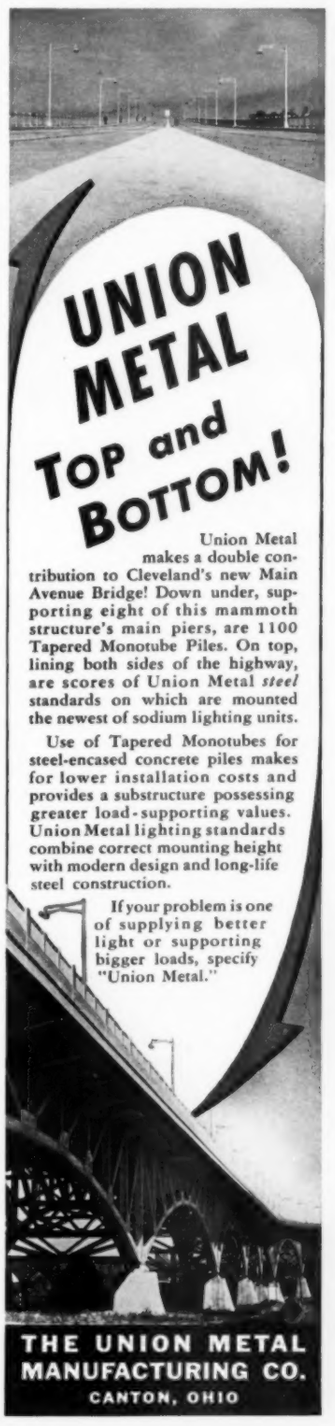
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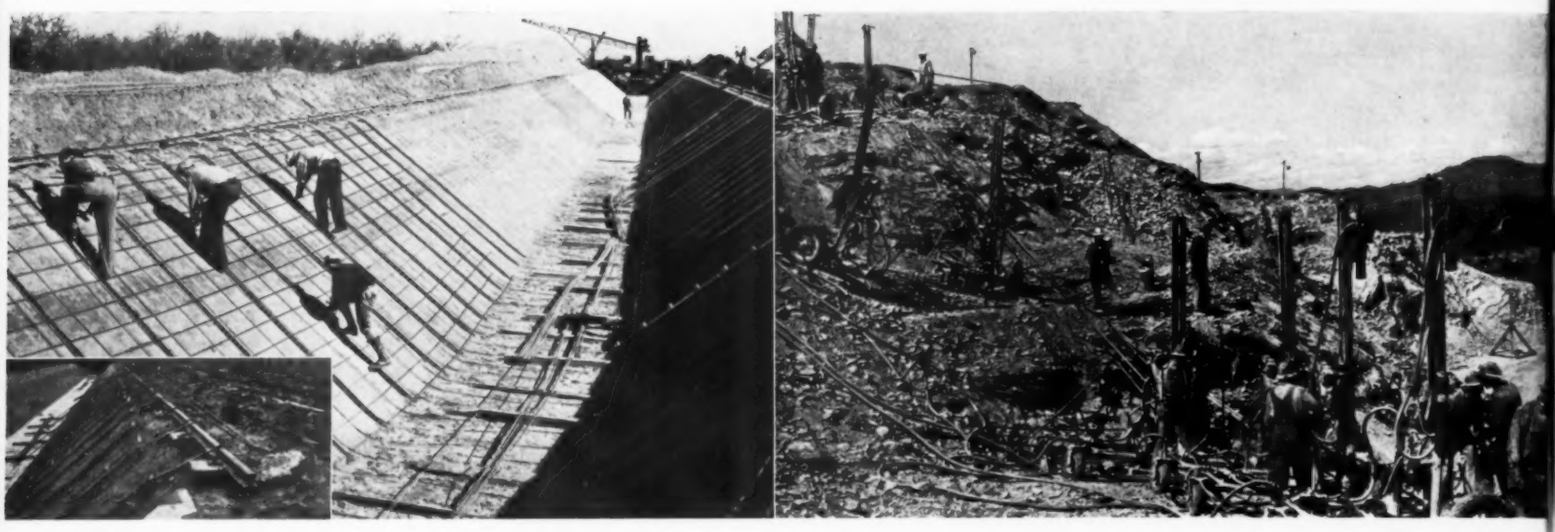
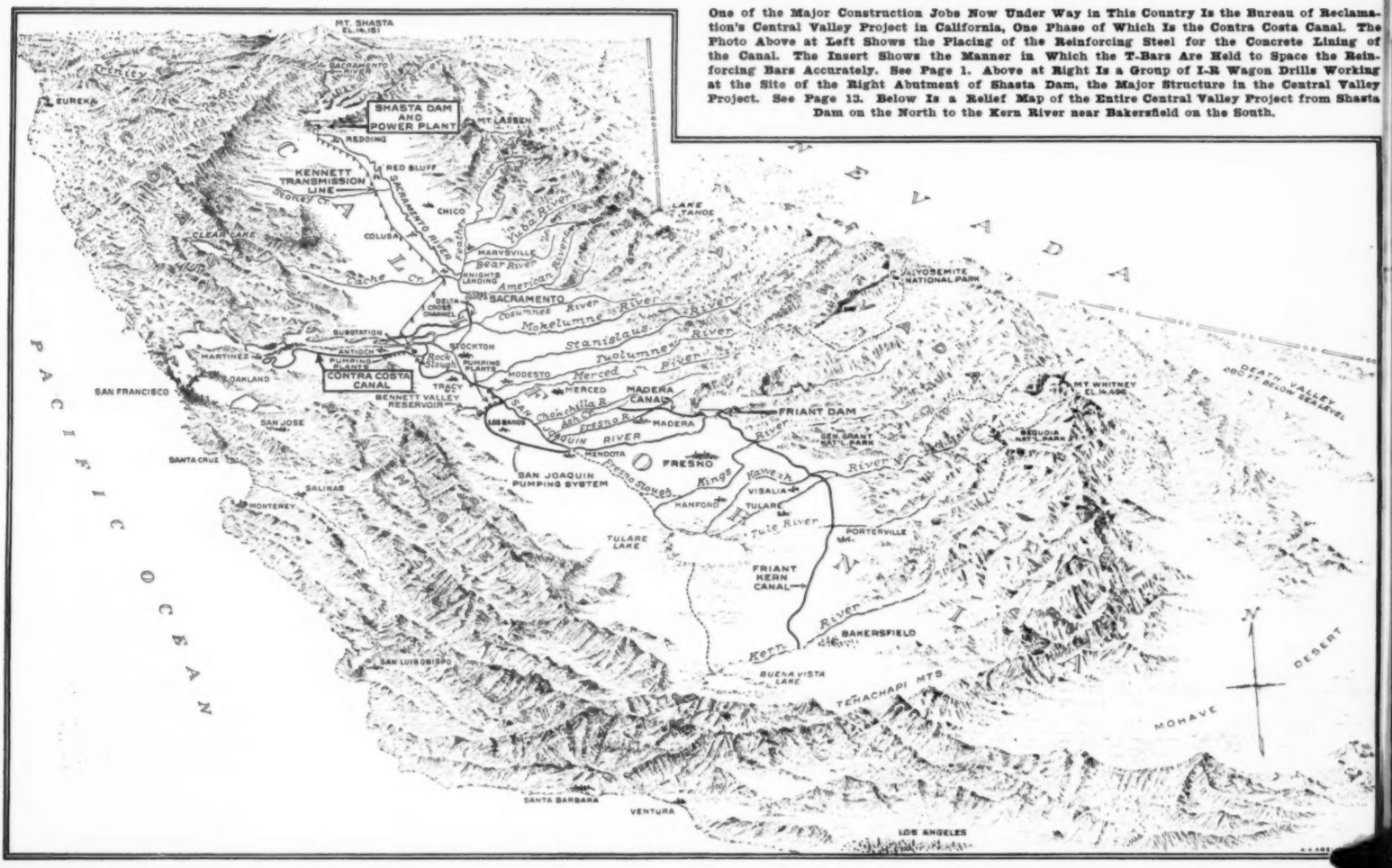


One of the Major Construction Jobs Now Under Way in This Country Is the Bureau of Reclamation's Central Valley Project in California, One Phase of Which Is the Contra Costa Canal. The Photo Above at Left Shows the Placing of the Reinforcing Steel for the Concrete Lining of the Canal. The Insert Shows the Manner in Which the T-Bars Are Held to Space the Reinforcing Bars Accurately. See Page 1. Above at Right Is a Group of I-R Wagon Drills Working at the Site of the Right Abutment of Shasta Dam, the Major Structure in the Central Valley Project. See Page 13. Below Is a Relief Map of the Entire Central Valley Project from Shasta Dam on the North to the Kern River near Bakersfield on the South.



C. & E. M. Photo

An Adnun Black Top Paver Laying Cold-Mix Binder Course on the J. R. Ford Co. Contract for Resurfacing Streets in Richmond, Va. See Page 20.

The Downstream Face of Marshall Ford Dam Near Austin, Texas. In the Foreground, the High-Line Raising a Concrete Bucket. See Page 2.

C. & E. M. Photo

Filming the Work of a Nevada Snogo As It Hurls Deep Snow from the Highway to Keep Traffic Moving During the Winter. See Page 2.

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It Hurls
Moving